POPULAR Computing WEEKLY

35p 3-9 February 1983 Vol 2 No 5

This Week

News Desk

TS2000 with new look silver finish

VARIATIONS on a theme. The new look Spectrum — the TS2000 and ZX Printer — the TS2040 have been specially designed by Timex for the American market

Apart from its silver exterior styling the TS2000 is the same as its familiar UK counterpart It will sell in the US for £95 (16K) and £127 (48K) available in the late spring

The TS2040 printer is larger than the British ZX Printer, and will sell for less than £65

As Timex announced the TS2000 machine the company also cut the price of its TS1000 machine (the ZX81 equivalent) by £10 The price drop takes the form of a rebate coupon and the offer applies only for a limited period until March 31

Summer plan for Binatone

THE BINATONE Personalized Computer, originally scheduled for launch in December last year, is now planned for launch in early summer

"We are hoping for a launch date in May or June and we are still aiming for a colour computer for around the £50 mark said Binatone Sales Manager, Stephen Oliver

The budget home computer will feature a full-size push-button keyboard, 16 colours, high resolution graphics and 16K Ram expandable up to 64K The on-board 12K Rom will run a version of Microsoft Basic The screen display format will be 64 characters × 16 lines

The computer will be fully portable with a built-in power supply cassette drive unit and RS232 interface The printer output will be 80 characters per line

It will be made in the Far East Binatone is looking for 100 000 sales through high street stores

Classified

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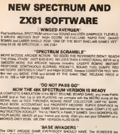
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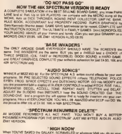
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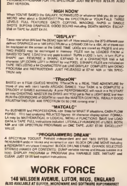
Continued on page 28

★ ★ BRITAIN'S HOME COMPUTER WEEKLY ★ ★

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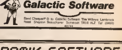
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3-9 February 1983 Vol 2 No 5

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How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long The articles and any accompanying programs, should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

Artificial Intelligence is a topic that is attracting increasing interest, both in the media and in the laboratory

With hard and software expertise seemingly growing at an almost exponential rate, the idea of a "thinking" computer is no longer ridiculous. It is not so much a question of "If" so much as "When".

But, while a number of people are devoting themselves to the mechanics of producing Artificial Intelligence, few people seem to have given much thought to the consequences. If computers can be devised that genuinely think, as opposed to simulating thought, will they be regarded as a new life form? If so, will they have the same rights as humans and will it become murder to switch them off?

These questions might seem a little fanciful, but they will have to be answered all the same. A thinking computer could quite conceivably develop needs and desires of its own that could conflict with those of its creators. How should such conflict be equitably resolved?

If we succeed in creating Artificial Intelligence we shall have to recognise that there is a price to pay. A computer with free will may be a dependant, it will not be a servant

Next Thursday

Enter the Cavern, a new game for the 16K Spectrum, by David Leitch. Also, Tony Bridge presents a review of the latest software for the still strong ZX81. David Kelly interviews the men behind the Oric-1 computer to assess the reality of their dream to do for the rest of the world what Clive Sinclair has done for Britain.

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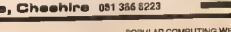
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Oric switches out of mail order

ORIC Products International is to discontinue mail-order sales of its Oric 1 microcomputer almost as soon as they have begun

This change in sales policy will mean that by March the Oric will only be available through an appointed dealership network and selected high-street stores So far the company has received more than 2,000 orders from mail-order customers

"Oric now believes that there is only one way to sell a home microcomputer — and that is retail " said sales director Peter Harding

A number of deals have already been concluded which will put the computer into the high street by April

From April onwards W H Smith will be stocking the 48K machine Although Oric claims that W H Smith will take more than 45 000 machines in 1983, a spokesman for the store would only confirm that W H Smith will be taking the computer "in substantial quantities"

The Spectrum chain, Laskeys, Greens and Curry's Micro C have also agreed to stock the computer Microperipherals and Tangerine (designers of the Oric 1) will act as dealers

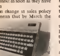
As with any product it takes time to get up to high-volume production,' explained Peter Harding But we hope to be out of mail-order by March this year "

Distribution deals have also been signed in France, Germany, Spain, Belgium, Scandinavia, Greece, Singapore and Portugal Oric is also considering manufacture of the Oric 1 under licence in the USA, Japan, India and Latin America

At present the company assembles and tests the printed-circuit boards in two operations running in Singapore. The cases are made and final assembly is undertaken at Kenure Plastics in Feltham

● Oric has announced preliminary details of a range of peripherals for the machine The Modem is planned for the end of April priced at £79 A four-colour, plain-paper printer is planned for the same time, priced around £150 Joysticks and double sided double-density 5¼ inch disc operating systems are scheduled for the end of May

Bug Byte, Artic and Salamander will be producing software for the machine — the first programs should be available in March



Atari signs big names

A VIDEO game based on the story and characters in the Speilberg film *Raiders of the Lost Ark* is just one of the projects in the pipeline, arising from a series of licensing agreements concluded by Atari

Other well-known faces soon to appear on Atari products are such characters as Mickey Mouse Snoopy, Woodstock and all the gang from the Peanuts strips

According to Graham Daubney Atari's UK Software Manager, the licences apply to both the Atari 400 and 800 computers and to the Atari VCS games machine system We will be using the characters, not just in arcade-type games, but also in a range of educational adventure games for younger children," he said

To accompany the new software for four to seven year olds Atari has announced a controller for the VCS machine with colourful 'chunky' keys

Harrison Ford in Raiders of the Lost Ark

Commodore gives voice

A SOPHISTICATED voice synthesizer add-on has been announced for the Commodore 64 microcomputer

Developed by Commodore s Speech Technology Division in Dallas, Texas, the low cost I/O unit can produce a variety of different voices — male, female, a child's or that of a cartoon character

The Speech Cartridge plugs into the Rom slot on the Commodore 64 machine It is addressable from the keyboard and operates using the Basic command word *Say* A typical program construction might be *Say* 'Thank you"

The most interesting application of the voice unit will be to add speech as an integral part of a program Using the cartridge it will be possible to make the characters in an animation sequence speak — with different voices for the different characters

Also supplied in the Rom cartridge is a learning program to help teach the alphabet

The speech synthesizer is planned for the second quarter of 1983, and will cost £65

Distribution by John Wiley

JOHN WILEY and Sons is to market and distribute Acornsoft's range of software and book titles

John Wilson, Wiley's computer publications editor, commented "We found an increasing awareness in the book trade for software and we have agreed to handle Acornsoft's titles "

Acornsoft will continue to promote its material direct but according to John Wilson although "the spirit of our agreement is that Wiley will concentrate on its established outlets, Acorn dealers will be able to get software from us if they wish '

The arrangement between the two companies applies to the UK the rest of Europe and Africa

More micros get government approval

MICROCOMPUTERS purchased for use by government departments are more likely to be British made following the announcement of new guidelines

The Treasury's Central Computer and Telecommunications Agency which advises on such things has produced a new list of manufacturers approved by the government

Of the 12 new companies on the list, seven are British — including ICL, Comart and Torch Those removed from the list include Commodore and Research Machines

David Broad, chairman of the British Microcomputer Manufacturers Group said that, although the new list was an improvement, many good British companies were still missing from it

Lisp for Spectrum

SERIOUS Software has developed a Lisp interpreter for the Spectrum

The artificial intelligence language is contained in just over 7K of code Features include over 50 predefined functions iteration via *Progn* and *While* a variable number of parameters to user defined functions full property list implementation and full error checking

The cassette, together with demonstration program and programmers' manual is available for £15 from Serious Software 7 Woodside Road, Bickley Bromley, Kent

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DRAGON'S TEETH

Our monthly Club Letter will shortly emerge from the depths of the Dungeon, where insomniac games-testers crouch chained to their Dragons, endlessly reviewing the latest software for your benefit

If you have identified any of those elusive addresses, have spotted any programming quirks of the 6809 or have any tips to assist fellow Dragon-bashers, send them along to the Dungeon

'Dragon's Teeth' is full of news, reviews, information and products. The Annual Subscription which includes software discount offers is £6.00 (six-month trial subscription £3.25)

Copies of David Lawrence's 'The Working Dragon 32' now in stock, £5.95 post-free



The Dragon Dungeon is always on the lookout for innovative software which exploits the Dragon's colour and sound potential, against royalty, outright purchase or sales agency. Secrecy Agreement exchange against unprotected tapes sent for evaluation

We should also like to get in touch with experienced programmers, who can translate detailed games concepts into working software on a contract basis

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Poking into memory

In the January 6 edition of *Popular Computing Weekly*, David Nowotnik presented a program to allow easy *Pok*ing to the Spectrum display memory. The routine was a mixture of Basic and machine code, with the result that it was not very fast.

The routine could have been written entirely in machine code — Figure 1 is a disassembly of just such a routine. David's expression for calculating screen addresses was also a little confusing, but Diagram 1 should make the method a bit clearer.

Program lines 10 to 90 of Figure 3 will locate the routine in the printer buffer: 23296. The desired Y X co-ordinates should then be *Poked* into 23297, 23298 respectively. The routine is completely relocatable, just remember to *Poke* Y X into the start address + 1, start address + 2. The result of the calculation is returned in *BC* so a *Usr* call will return it directly to a variable if desired.

Figure 2 is another machine code routine for calculating screen addresses, only this time it will convert the address in *HL* to its Spectrum equivalent. The address in *HL* is the value you would expect to use if the Spectrum screen memory was arranged in a conventional manner, ie:

Line 0 Column 0 = 4000H 16384 D
Line 1 Column 0 = 4020H 16416 D
Line 2, Column 0 = 4040H 16481 D
and so on

The conventional address can be calculated by 16384 + 32 × line + column where line is in the range 0-191 and column is in the range 0-31.

While this may not seem very useful to the Basic programmer, where using *X Y* co-ordinates is the usual method, it is very useful to someone using machine code where a single 16-bit address is often more convenient. Using this routine allows you to move blocks of the screen around using conventional addressing techniques and calling the converter to translate into 'Spectrumese'.

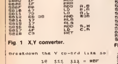
Like the first routine, the result is returned in *BC* but it does not allow you to *Poke* in the data from Basic. If you wish to use the routine from Basic you should add a *LD HL, nn* instruction (33, 0, 0) to the start and then *Poke* in the value as in the first program. Remember though that here it expects an address, not co-ordinates.

This routine is also relocatable — the loading program in Figure 3 lines 110 to 200 locate it at 23321. Also, bear in mind that the listings in Figures 1 and 2 is in Z80 assembler and should not be entered as part of a Basic program.

Larry Carasco
43 Broadfield Close
Dollis Hill
London NW2 6NR

```
5B00  21 00 00   LD   HL,#0000
5B03  7D         LD   A,L
5B04  E6 07      AND  #07
5B06  C6 40      ADD  A,#40
5B08  47         LD   B,A
5B09  7D         LD   A,L
5B0A  E6 C0      AND  #C0
5B0C  1F         RRA
5B0D  1F         RRA
5B0E  1F         RRA
5B0F  80         ADD  A,B
5B10  47         LD   B,A
5B11  7D         LD   A,L
5B12  E6 38      AND  #38
5B14  17         RLA
5B15  17         RLA
5B16  84         ADD  A,H
5B17  4F         LD   C,A
5B18  C9         RET
```

Fig. 1 X,Y converter.



Diag. 1 Address calculation.

```
5B19  7C         LD   A,H
5B1A  26 40      LD   H,#40
5B1C  94         SUB  H
5B1D  47         LD   B,A
5B1E  E6 18      AND  #18
5B20  84         ADD  A,H
5B21  67         LD   H,A
5B22  7D         LD   A,L
5B23  4F         LD   C,A
5B24  E6 E0      AND  #E0
5B26  17         RLA
5B27  17         RLA
5B28  17         RLA
5B29  17         RLA
5B2A  84         ADD  A,H
5B2B  67         LD   H,A
5B2C  78         LD   A,B
5B2D  1F         RRA
5B2E  1F         RRA
5B2F  1F         RRA
5B30  1F         RRA
5B31  E6 E0      AND  #E0
5B33  6F         LD   L,A
5B34  79         LD   A,C
5B35  E6 1F      AND  #1F
5B37  85         ADD  A,L
5B38  4F         LD   C,A
5B39  44         LD   B,H
5B3A  C9         RET
```

Fig. 2 Address converter.

```
10 FOR a=23296 TO 23320
20 READ b: POKE a,b
30 NEXT a
40 REM X,Y Converter
50 DATA 33,0,0,125,230
60 DATA 7,198,64,71,125
70 DATA 230,192,31,31,31
80 DATA 128,71,125,230,56
90 DATA 23,23,132,79,201
100 REM
110 FOR a=23321 TO 23354
120 READ b: POKE a,b
130 NEXT a
140 REM Address converter
150 DATA 124,38,64,148,71,230
160 DATA 24,132,103,125,79,230
170 DATA 224,23,23,23,23,132
180 DATA 103,120,31,31,31,31
190 DATA 230,224,111,121,230,31
200 DATA 133,79,68,201
```

Fig. 3 Decimal data.

Action on libraries . . .

I thought you might be interested to know the position of Bug Byte Software in relation to software lending libraries.

We are thoroughly opposed to all forms of lending, hiring, or exchanging by such bodies, and are prepared to take legal action to protect our interests.

It would appear that other major software houses have a similar view and we would therefore be obliged if you would consider withholding any future advertisements from software lending libraries.

A D Baden
Bug Byte Software
98-100 The Albany
Old Hall Street
Liverpool L3 9EP

. . . or business threatened

After your recent article concerning software lending libraries *PCW* January 6 1983 it has come to our attention that there has been a marked increase in the activities of these outfits.

As an independent software house the success of our business depends on there being sufficient customers for our products.

If, however, those customers can easily obtain a copy of the cassettes from a lending library which pays no royalties, licensing fees or compensation for loss of sales, then I am sure you will agree that this type of business is both bad for ourselves and for the industry as a whole, which includes your magazine.

I would appreciate some information as regards your views on this matter and also the general feeling amongst other software suppliers.

Douglas Bern
Silversoft
20 Orange Street
London WC2H 7ED

We have now received several letters from software companies expressing concern about the recent growth in lending libraries. The view of most of these companies is that the business of lending out taped software is illegal, especially if permission has not been obtained first. As Gail Counsell explains, on page 10, the law is not so simple.

It is our view that the sensible way forward is

(a) Each cassette should display a message, in a prominent position on the outside, stating that it is a condition of sale that the cassette will not be hired or lent

(b) A group or association of software companies should club together to enforce the contract in (a).

***Popular Computing Weekly* would be quite happy to hear from any software companies interested in such an approach**

Tank Battle

A new game for the BBC Model B by J Meredith

This program, for a Model B BBC Micro simulates a tank battle. The object of the game is to destroy the enemy tank before it destroys you. The computer controls the black tank while you control the yellow tank.

There are 40 white barriers which give protection to the player's tank. If either tank drives over a barrier it is destroyed. When a missile shot from either tank hits a barrier, then the barrier will explode.

There are nine levels of play. As the level is increased, the enemy tank starts to move faster. Also the enemy tank is more likely to dodge your missiles.

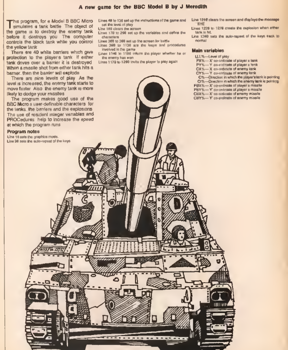
The program makes good use of the BBC Micro's user-definable characters for the tanks, the barriers and the explosions. The use of resident integer variables and PROCedures help to increase the speed at which the program runs.

Program notes

Line 10 sets the graphics mode.
Line 30 sets the auto-repeat of the keys.
Lines 40 to 130 set up the instructions of the game and set the level of play.
Line 160 clears the screen.
Lines 170 to 290 set up the variables and define the characters.
Lines 300 to 380 set up the screen for battle.
Lines 390 to 1130 are the loops and procedures involved in the game.
Lines 1140 to 1160 inform the player whether he or the enemy has won.
Lines 1170 to 1200 invite the player to play again.
Line 1210 clears the screen and displays the message "BYE".
Lines 1220 to 1270 create the explosion when either tank is hit.
Line 1360 sets the auto-repeat of the keys back to normal.

Main variables

LLL%—Level of play
PX%—X' co-ordinate of player's tank
PY%—Y' co-ordinate of player's tank
CX%—X' co-ordinate of enemy tank
CY%—Y' co-ordinate of enemy tank
C%—Direction in which the player's tank is pointing
CI%—Direction in which the enemy tank is pointing
PBX%—X' co-ordinate of player's missile
PBY%—Y' co-ordinate of player's missile
CBX%—X' co-ordinate of enemy missile
CBY%—Y' co-ordinate of enemy missile



```
10 MODE 1
20*FX11,10
30ON ERROR GOTO 1280
40 PRINT"                TANK BATTLE
50 PRINT"                -----------"
60PRINT '' KEYS:'
70PRINT'"       E - To move tank up
80PRINT'       D - To move tank down"
90PRINT'       F - To move tank left
100PRINT'      G - To move tank right
110PRINT'      H - To fire a missile
120 INPUT'''"Type level of play."''1 is easy,
9 is  very hard."''"The number should be in the
range of 1-9",LLL%
130 CLS:PRINT''''''''''' B E T
R E A D Y '':FORX=1 TO 10:SOUND 1,-15
,100,5:SOUND 1,0,100,5:NEXT
140 IF LLL%<1 OR LLL%>9 THEN RUN
150 LLL%=10-LLL%
160 CLS
180 BB%=0
190 VDU 23,224,24,24,219,219,255,255,219,219
200 VDU 23,225,63,63,12,255,255,12,63,63
210 VDU 23,226,219,219,255,255,219,219,24,24
220 VDU 23,227,252,252,48,255,255,48,252,252
230 VDU 23,228,60,126,255,255,255,255,126,60
240 VDU 23,229,0,0,0,24,24,0,0,0
250 VDU 23,230,0,0,36,0,0,36,0,0
260 VDU23,231,0,65,0,0,0,0,65,0
270 VDU23,232,129,0,0,0,0,0,0,129
280 VDU 23,233,0,0,0,0,0,0,0,0
290 PX%=20:PY%=12:CX%=37:CY%=30:C%=227:F%=0:
PBX%=-1:PBY%=-1:C1%=0:F1%=0:CEX%=0
:CEY%=0:PEX%=0:PEY%=0:PEF%=0:CEF%=0:CEC%=0:CEF%=0
300 VDU 19,0,1,0,0,0,19,1,0,0,0,0
310 COLOUR 2
320 PRINT TAB(PX%,PY%);CHR$(227)
330 COLOUR 1
340 PRINT TAB(CX%,CY%);CHR$(225)
350 COLOUR 3
360 FOR X=0 TO 40
370 PRINT TAB(RND(34)+2,RND(26)+2);CHR$(228)
380 NEXT
390 A$=INKEY$(0):*FX 15,0
400 TX%=PX%:TY%=PY%
410 IF A$="E"THEN PY%=PY%-1:C%=224:IF PY%<2
THEN PY%=30
420 IF A$="F"THEN PX%=PX%-1:C%=225:IF PX%<0
THEN PX%=38
430 IF A$="G"THEN PX%=PX%+1:C%=227:IF PX%>38
THEN PX%=0
440 IF A$="D"THEN PY%=PY%+1:C%=226:IF PY%>30
THEN PY%=2
450 IF PX%=CX% AND PY%>CY% AND F1%=0 THEN C1%=
226:PROCSHOOT
460 IF PX%=CX% AND PY%<CY% AND F1%=0 THEN C1%=
224:PROCSHOOT
470 IF PY%=CY% AND PX%<CX% AND F1%=0 THEN C1%=
225:PROCSHOOT
480 IF PY%=CY% AND PX%>CX% AND F1%=0 THEN C1%=
227:PROCSHOOT
490 IF F1%=1 THEN PROCSHOOT
500 IF CEF%=1 THEN PROCEXPL
510 IF PEF%=1 THEN PROCEXPLP
520 IF A$="H"AND F%=0 THEN 580
530 COLOUR 2
540 IF TX%=PX% AND TY%=PY% THEN 570
550 PRINT TAB(TX%,TY%);" "
560 PRINT TAB(PX%,PY%);CHR$(C%)
570 IF F%=0 THEN 740 ELSE 640
580 IF C%=224 THEN PBX%=PX%:PBY%=PY%-1:BMX%=0:
BMY%=-1
590 IF C%=225 THEN PBX%=PX%-1:PBY%=PY%:BMX%=-1
:BMY%=0
600 IF C%=226 THEN PBX%=PX%:PBY%=PY%+1:BMX%=0:
BMY%=1
610 IF C%=227 THEN PBX%=PX%+1:PBY%=PY%:BMX%=1:
BMY%=0
620 F%=1
630 SOUND 0,-15,6,10
640 PBY%=PBY%+BMY%
650 PBX%=PBX%+BMX%
660 IF PBY%<2 OR PBY%>30 OR PBX%<0 OR PBX%>38
THEN F%=0:PRINT TAB(PBX%-BMX%,PBY%-BMY%);" ":PBX%
=-1:PBY%=-1:GOTO 740
670 IF ?(HIMEM+PBY%*640+PBX%*16+4)[illegible]
THEN F%=0:GOTO 720
680 IF PBX%=CX% AND PBY%=CY% THEN
PROCEXPLODE:GOTO 1160
690 PRINT TAB(PBX%-BMX%,PBY%-BMY%);" "
700 PRINT TAB(PBX%,PBY%);CHR$([illegible])
710 GOTO 740
720 PRINTTAB(PBX%-BMX%,PBY%-BMY%);" ":PEX%=PBX%:
PEY%=PBY%:PEC%=229:PEF%=1:GOTO 740
730 DEFPROCEXPLP:COLOUR3:PRINTTAB(PEX%,PEY%);
CHR$(PEC%):PEC%=PEC%+1:IF PEC%=23
4 THEN PEF%=0:ENDPROC
740 IF BB%<LLL%*2 THEN BB%=BB%+1 ELSE [illegible]
750 IF BB%>1 THEN 790
760 OCX%=CX%:OCY%=CY%
770 IF F%=1 AND PBX%=CX% AND INT(RND(LLL[illegible]
=1THEN CX%=CX%+1:C1%=227:GOTO 850
780 IF F%=1 AND PBY%=CY% AND INT(RND(LLL[illegible]
1 THEN CY%=CY%+1:C1%=226:GOTO 850
790 IF F%=1 AND (PBX%=CX%+1 OR PBX%=CX%-1) THEN
390
800 IF F%=1 AND (PBY%=CY%+1 OR PBY%=CY%-1) THEN
390
810 IF PX%>CX% THEN CX%=CX%+1:C1%=227:GOTO 850
820 IF PX%<CX% THEN CX%=CX%-1:C1%=225:GOTO 850
830 IF PY%>CY% THEN CY%=CY%+1:C1%=226:GOTO 850
840 IF PY%<CY% THEN CY%=CY%-1:C1%=224:GOTO 850
850 IF CX%<0 THEN CX%=38
860 IF CX%>38 THEN CX%=0
870 IF CY%>30 THEN CY%=2
880 IF CY%<2 THEN CY%=30
890 COLOUR 1
900 IF OCX%=CX% AND OCY%=CY% THEN970
910 PRINTTAB(OCX%,OCY%);" "
920 PRINTTAB(CX%,CY%);CHR$(C1%)
930 GOTO 390
940 DEFPROCSHOOT
950 IF F1%=1 THEN 1020
960 COLOUR1:PRINT TAB(CX%,CY%);CHR$(C1%)
970 IF C1%=224 THEN CBX%=CX%:CBY%=CY%-1:CMX%=0:
CMY%=-1
980 IF C1%=225 THEN CBX%=CX%-1:CBY%=CY%:CMX%=-1:
CMY%=0
990 IF C1%=226 THEN CBX%=CX%:CBY%=CY%+1:CMX%=0:
CMY%=1
1000 IF C1%=227 THEN CBX%=CX%+1:CBY%=CY%:CMX%=1:
CMY%=0
1010 F1%=1
1020 SOUND [illegible] 15,5,10
1030 CBY%=CBY%+CMY%
1040 CBX%=CBX%+CMX%
1050 IF CBY%[illegible] OR CBY%[illegible] OR CBX%<0 OR CBX%>38
THEN F1%=0:PRINT TAB(CBX%-CMX%,C
BY%-CMY%);" ":ENDPROC
1060 IF ?(HIMEM+CBY%*640+CBX%*16+4)=255 THEN
F1%=0:PRINT TAB(CBX%-CMX%,CBY%-CMY
%);" ":GOTO1110
1070 IF CBX%=PX% AND CBY%=PY%THEN PROCEXPLODE:
GOTO1140
1080 PRINT TAB(CBX%-CMX%,CBY%-CMY%);" "
1090 PRINT TAB(CBX%,CBY%);CHR$(229)
1100 ENDPROC
1110 F1%=0:CEX%=CBX%:CEY%=CBY%:CEC%=229:CEF%=1:
ENDPROC
1120 DEFPROCEXPL:COLOUR2:PRINT TAB(CEX%,CEY%);
CHR$(CEC%):CEC%=CEC%+1:IF CEC%=234 THEN CEF%=0
1130 ENDPROC
1140 VDU20:CLS:PRINT''"      I WIN, YOU ARE DEAD"
1150 GOTO 1170
1160 VDU20:CLS:PRINT '' "YOU WIN"
1170 *FX 15,0
1180 INPUT '' "Another game ",A$
1190 IF A$="YES" OR A$="yes" THEN RUN
1200 IF A$<>"NO" THEN 1180
1210 CLS:PRINT "BYE":GOTO 1280
1220 DEFPROCEXPLODE
1230 FOR N=1TO 20
1240 FOR W=1 TO100:NEXT
1250 VDU 19,N,[illegible],19,N-1,7,0,0,0,0
1260 VDU 19,1,[illegible],19,2,2,0,0,0,19,3,7,0,0,0
1270 NEXT:ENDPROC
1280 *FX 11,50
1290 END
```

Tread Softly, pioneer

Gail Counsell tries to untangle the legal jungle created by micro technology

How the law affects computer programs is a thorny subject just at the moment.

Many headaches are being caused by uncertainties in the way software fits into the existing legal structure.

Everyone agrees programs should receive some sort of protection from unfair copying, but no-one seems sure how far they want it to go. And a lot of non-programmers — book and film authors and board-game inventors for example — are very concerned that they should be properly protected *against* computer games.

Copyright, trade marks, passing-off and contract are just some of the areas of the law which affect software. But their exact influence is very difficult to assess. Computers have developed so quickly that the law has not really caught up. Trying to guess where the lines will be drawn is what is causing all the problems.

Gail Counsell

Probably the most talked-about aspect of software protection is copyright. One reason for this interest is that copyright law offers a very wide-ranging protection. If a computer program is copyright (and, though this has not yet been conclusively decided, most people assume it will be) then it is automatically protected against a number of unauthorised acts. The most important of these is the making of copies.

Copyright protection would extend to cover both direct copies of the tape itself and copies made using all or part of the program listing. It would also prevent translations of the program — for example from Basic to Forth, adaptations taking the basis of the program and changing some of the surrounding element and even dramatisations — for instance turning a game program into a play or novel. This is because you cannot 'copy' a program even into a different form. So you probably should not make a three-dimensional board-game copy of someone else's computer game.

This also all applies in reverse. It would probably be a breach of copyright to take an existing board game and turn it into a computer game. And, while we are on the subject, it may also be a breach of trade mark law if the name of the game has been registered and you reproduce it without permission.

Unlike copyright, trade marks have to be applied for. They are not automatically granted — you have to fulfil certain criteria. The trade mark has to be in respect of certain types of goods — games are one sort — and the words used have to be *distinctive*. So they can't be everyday words like 'football' or 'chess' (on their own, at any rate).

The other danger in converting a game in this fashion is that its original author will claim it is a case of 'passing off'. This is a legal rule which says you must not mislead people — even unintentionally — into thinking that your goods are actually someone else's.

You must not 'pass off' your computer game as someone else's board game. It does not matter that one is a computer game and the other a board game.

Similar problems arise if you want to use a character from a film or play in your game program. The names of characters are not copyright (though be careful — they may be protected by trade marks) but the visual presentation of them may well be — Mr Spock's ears for example! When such famous characters are used in a game by a reputable software house, permission is always obtained first. This is called a 'licence' and usually gives the company concerned sole rights to a particular fictional individual. Atari, for example, has recently signed a licensing agreement with Walt Disney to use all its characters. In a similar way, Melbourne House agreed with the Tolkien Estate to use the characters from The Hobbit.

A game based on a novel or film may be a breach of copyright. The plot by itself is not copyright, but once you add in characters, incidents and dialogue it soon becomes copyright and 'borrowing' from it will probably be a breach. The line drawn is a very fine one because to some extent it depends on the *degree* to which you use these elements.

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Another area in which copyright may be important is that of compilers and assemblers. These convert from Basic and hexadecimal addresses, respectively, to varieties of object code. Object code is very like machine code. Compilers are particularly useful. Anyone who can write a game in Basic can compile it to object-code producing the kind of fast arcade action not possible with Basic.

Some companies which sell compilers have been demanding a royalty payment — a cut, if you like — on each cassette sold where the compiler has been used to write the program. In addition to adding to the cost of cassette software, the logic of such a royalty payment is rather doubtful. It is presumably based on the argument that the compiler is 'translating' the program.

Under copyright law the authorised translator of a copyright work gets copyright in the *translation*. For the translation to be copyright, however, it has to be "an original piece of work produced by skill or labour". Probably a court, if asked, would say that a purely mechanical process like that of the compiler, wouldn't count. Rather the compiler would be like the artist's brush — a tool rather than an originator. If the product of the compiler is *not* copyright then why should a royalty be charged? The manufacturer who sells the artist the brush does not claim a royalty on every picture!

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There are two other 'hot' legal topics at the moment.

Take lending libraries. These are a recent development as far as software is concerned. They operate in much the same way as book, record and video libraries. In return for payment of a membership subscription plus a hiring fee they loan out cassettes for short periods.

Inevitably, some of those who borrow cassettes *do* so to make copies of them — despite the fact there is often a rule of membership against this. Of course this is almost certainly a breach of copyright, as

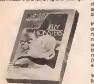


David Paterson a founding partner of Silversoft.

well as of the membership rules (The only thing which prevents this being definitely the case is the lack of a court decision conclusively stating that programs are copyright)

To software houses these libraries represent a threat to sales and some of them — Silversoft for example — are starting to take an agressive stand After all, it is argued that, as well as making it easier for people to make illicit copies they also discourage purchases — why buy when you can rent more cheaply The libraries though contend that they actually encourage sales Not only do the libraries themselves represent significant bulk buyers of cassettes but many — Sinclair Owners Software Library for example — encourage their members to buy programs they have hired To the extent that they stimulate interest in computer games generally, it can be said they help to build up a market

This is the approach taken by Commodore who, unlike other software houses, do not include a prohibition against lending or



Jellymonsters — offending Atari

hiring on the outside of their cassettes Other companies have not yet made up their minds — Thorn/EMI and Atari for instance both say they are urgently reviewing what position they should take towards these libraries

Their decision is not made any the easier by the fact there have not yet been any cases on lending and hiring software. This means the exact legal status of the libraries is uncertain

The situation is however, similar to that of record libraries This parallel is underlined by the fact that some of the companies involved in record manufacture are also engaged in producing computer programs Thorn/EMI for example And there have been cases on the legality of record lending libraries

Lending and hiring without permission is not specifically forbidden under copyright law So the record companies trying hard to stop the libraries attempted to argue that libraries were 'authorising breaches of copyright They said when the libraries lent out records they knew (and did not care) that they would be taped and that this was an 'authority in effect 'Authorising a breach of copyright is an offence in itself

But the courts would have none of it They said this was stretching the meaning of the word too far

Then one of the record companies — Thorn/EMI in fact — tried a different argument based not on *copyright* but on *contract* They managed to stop a dealer from lending out their records because a clause in his dealership agreement said that he couldn't. Though they were successful the trouble with this argument as far as they are concerned is that it does not help them against independent libraries — only against people who have come to special supply arrangements with them

So it seems software libraries are not themselves committing any breaches of copyright If they have dealership agreements though, they may be committing a breach of contract. Such agreements are not common however There is one other way the libraries could be said to be committing a breach of contract This involves the second hot topic

Many cassettes carry notices on them claiming they are copyright and warning against making copies Some also say the cassettes must not be lent or hired out.

Such clauses are not strictly necessary from the copyright point of view In this country, at any rate if something is copyright then it is automatically protected — no word copyright' or '(c) is needed A copyright notice does however draw the buyer's attention to the fact that the program has such protection (if indeed it does) (In America a copyright notice *is* necessary before the material is protected.)

But these clauses may have another function They can be attempts to bind contractually the person buying the cassette. Such notices are promises — the seller promises to sell you the program but only if you promise not to copy or lend it.

While copyright law can probably not be used to restrict lending and hiring such a contractual promise may work This is a very complicated legal area and for various reasons the attempt could fail The clause needs to be clearly visible *before* you buy the cassette, for a start. Many of these clauses are inside the packaging and can serve as no more than warning notices

This is also true for mail order cassettes — the clause would have to be displayed in the advertisement to stand any chance of working

The big disadvantage of such clauses for software houses is that they do not 'bind third parties ' This means that only the person buying the cassette is stopped

Alec Fry founder Sinclair Owners Software Library

from hiring or lending it Someone buying or being given it later on would not be.

One final interesting point concerns so-called 'breaker' programs These are used to break into a machine-code program designed to auto-run on loading Whether these are legal or not may depend on whether they have any purpose other than to help people break into copyright programs to copy them If they have not then it may be that they form some sort of 'authority' to make an illicit copy If so then those selling them might also be committing a breach of copyright.

No one is likely to get thrown into gaol merely because he commits a breach of copyright, contract or any of these other matters — breaches of what are called the 'civil' law are not punishable by a stretch in the 'pen ! But he can be made to hand over any profits he may have made out of things he has done which he should not have He may also have to pay damages for any financial loss he may have caused — and that can be a very expensive business

With so many grey areas in the law at the moment as far as software is concerned it may be just as well to err on the side of caution

● On the letters page of this issue, 7, *Popular Computing Weekly* replies to complaints against lending libraries from Bug Byte Software and Silversoft PSC is offering to help bring software companies together to take some joint action

Adventure trails

***Mike Grace** ruminates on a selection of Vic Adventure games.*

Computer games fall into several distinct categories Invaders type, Educational, Traditional (such as chess), and Adventure. Of course there are subdivisions within those categories, and there are some which do not fit into any of the above, but to my mind most software can be classified within one of these major divisions

Adventure games form a particular genre and have a mystique all their own (see my review of the Commodore range in *Popular Computing Weekly* Volume 1.25) It is this type of game that I am reviewing in this article However not all Adventure-type software is of the traditional type — sometimes to its advantage

The first batch of Adventure games I tried was from *Leisure Soft* in Blackpool These games were in cassette form with very attractive cardboard sleeves inside cases depicting assorted wizards demons swords and the other characters typically found in fantasy stories

Closer scrutiny reveals the artwork to be a trifle amateurish It always seems a shame that a little more effort and time spent in considering packaging would go a long way towards selling the final product In software the customer still seems to have to put up with a low standard from so many sources

Having experienced the Scott Adams series, produced by Commodore, I was a little surprised by these three offerings The format was essentially the same, (instructions on the screen answered by appropriate text) but the general standard





Mike Grace our cheerful reviewer

was much lower Silly spelling errors crept in occasionally and many of the messages seemed less helpful to my essentially novice status

More seriously, some of the directions were incorrect so that if I went north to one location I found that by typing south again I would not return to the correct place but to somewhere else To be fair this only happened in one adventure, but in another I never succeeded in leaving the first location as whatever I typed resulted in my being left in the same place Although this may be due to some incredible stupidity on my part after about 15 minutes of frustrated attempts I gave up assuming it to be a bug in the program

There were three different adventures to discover. *Time Machine* was one where I was promised (in the sketchy synopsis written on the accompanying instruction leaflet) that I would have to search for all three glass prisms and insert them into the *Time Machine* This would have unpredictable results

To start with I was stranded on a foggy moor looking for the eccentric Dr Potter's old house late at night Basic good stuff of which adventures are made — but alas this was the program I could not solve at all as whichever direction I typed resulted in the same message "you are on a foggy moor" flashing back onto the screen If this is a bug perhaps I can explore *Time* more satisfactorily later

The other two adventures are part of a trilogy which starts with the *Golden Baton* adventure and follows with the *Arrow of Death* Parts I and II It concerns Tolkienesque characters in the ancient Kingdom of Elves *Golden Baton* was the better of the two as I managed to get quite a long way into the adventure and the continuity was good *Arrow of Death* (Part I) annoyed me by failing to adhere to a proper map I gave up at an early stage

The cassettes cost £9 95 plus 50p postage, so are much cheaper than Commodore's range but the amateurish style (both in presentation of the packaging and of screen layouts in the messages themselves) detracts greatly and I would prefer to pay more for a better game However if you want to struggle with an adventure for

TRADER



IT IS HARD ENOUGH
TO LOOK AT AN
AMORPHOUS HYDROSILICON
BLOB FROM PSI,
NEVER MIND SWING A
DEAL WITH ONE.
BUT WHEN THEY ASK TO
PICK YOUR BRAINS...

PIXEL

a lot less money than try *The Golden Baton* first and hopefully Leisure Soft will tidy up the other two to make them easier

One of the problems with Adventure games is that they are difficult to solve very time-consuming and at times extremely frustrating, (which is why they are so appealing to some people of course) But younger children and less enthusiastic adults might like a simpler alternative to the traditional adventure which is easier to solve Impact Software has produced just

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Editor

on Dragon

The Dragon's Microsoft editor is excellent but there are two extra commands which the manual doesn't mention, these are

'A Refills the edit buffer with the original program line, (this is useful when editing has become confused)

'Q Aborts the editor, makes no changes to program line and gives OK prompt

Yet another major omission from the Dragon manual is the *Dn Error* message. This stands for 'Device Number Error' and occurs if the number in an *Open/Close/Eof* command is not 0, −1, or −2. Try *Print Eof*(−7) for example.

Peter Chase's article on repeating *Inkeys* is very good (issue 36) but his function which needs a whole subroutine may be reproduced in one line as

```
10 DEF FNA(A)=ABS(PEEK(135)*((PEEK(65280) OR 128)<>255))
```

and may be used by A=FNA(0) where A will equal the Ascii code of any key being pressed. A will equal zero if no key is being pressed.

It can be annoying when writing programs which require Yes/No answers to have to check for both upper and lower case letters. Memory location 329 is the lower case on/off switch. *Poke* 329,0 turns lower case on, *Poke* 329,255 turns it off.

Anybody writing machine code programs should find the following notes especially useful:

165 & 104	Line number of program line currently being executed
136 & 137	PRINT@ position in memory. Ie if PRINT position were at 23, PEEK(137)+256 *PEEK(136) would give 1047
337 to 345	Keyboard check.
426 to 433	Name of file being searched for
434 to 441	Name of file being loaded
274 & 275	Value of TIMER function
For the PLAY command	
226	TEMPO
225	NOTE DURATION
222	CONTROLS OCTAVE

Locations 346 to 349 contain the values of *Joystick*(0) to *Joystick*(3) respectively. These may be updated by calling the Rom routine which starts at location 48466. In Basic this would be *Exec*(48466).

Locations 65494 and 65495 are used to alter the CPU speed. *Poke* 65495,255 will double the speed to 1.8 MHz, *Poke* 65494,255 returns it to its normal speed. The Dragon is not designed to run at 1.8 MHz and so I don't really recommend its frequent use in programs. Other useful Rom routines that may be called are:

EXEC(41134) which will flash the cursor until any key is pressed.

EXEC(46080) which will restart BASIC giving the usual (C) 1982 DRAGON DATA LTD message.

Bit 3 of location 65313 controls the cassette relay: 1 is on, 0 is off. Bit 0 of location 65312 is the cassette data input.

Finally, I give below two machine code routines that may be of general use: the first scrolls the Hi-Res screen down by one pixel in *Pmodes* 3 and 4, the second can be used to either invert the whole text screen to white on black or clear the text screen to an Ascii character. The routines can be located anywhere in Ram as they contain no absolute jumps etc.

```
10 CLEAR 200,31999
20 DATA 142,23,223,16,142,23,255,166,137,
   0,0,167,160,6,0,49,63,48,31,140,255,256,46,
   239,57
30 FOR I=1 TO 25
40 READ A: POKE 31999+I,A
50 NEXT I
```

call by EXEC(32000)

Screen invert/clear

```
10 CLEAR 200,31999
20 DATA 142,0,0,166,137,
   4,0,132,191,167,137,4,0,48,1,140,2,0,37,239,57
30 B=32050: FOR I=0 TO 20: READ A
40 POKE B+I,A
50 NEXT I
```

call by EXEC(B)

To change to screen clear, *Poke* B+7,134 and *Poke* B+8, Ascii of required character. These two routines can be used separately or together.

Editor
by Brian Cadge

Colour Strips

on Spectrum

This program draws in the right-hand bottom corner of the screen the Spectrum colour stripes. It is numbered in such a way as to be easily *Merged* with other programs to provide an extra splash of colour to a title page.

The program uses the *Inverse* function by making the yellow and blue stripes from ink colour which has been inverted to paper.

As it stands the main paper colour of the page is defined by the variable 'P' but this can obviously be altered to suit requirements. It may be necessary to change or even delete line 9610 in these circumstances.

```
9600 REM © Steve Mercer 1982
9605 LET p=0
9610 BORDER 7: PAPER p: CLS : IN
K 2
9615 LET x=64: LET y=88
9620 FOR n=191 TO 255
9625 PLOT n,0: DRAW x,y
9630 LET x=x-1: LET y=y-1
9635 NEXT n
9640 LET x=58: LET y=88
9645 INVERSE 1
9650 FOR n=208 TO 255
9655 PLOT PAPER 6,n,0: DRAW PAPE
R 6,x,y
9660 LET x=x-1: LET y=y-1
9665 NEXT n: INVERSE 0
9670 INK 0: LET x=38: LET y=38
9675 FOR n=217 TO 255
9680 PLOT n,0: DRAW x,y
9685 LET x=x-1: LET y=y-1
9690 NEXT n
9695 INVERSE 1: LET x=26: LET y=
26
9900 FOR n=229 TO 255
9905 PLOT PAPER 5,n,0: DRAW PAPE
R 5,x,y
9910 LET x=x-1: LET y=y-1
9915 NEXT n: INVERSE 0
9920 INK 0: LET x=14: LET y=14
9925 FOR n=241 TO 255
9930 PLOT n,0: DRAW x,y
9935 LET x=x-1: LET y=y-1
9940 NEXT n
9945 STOP

string array     a$(2,4,8)
string array     b$(20,10)
variable array   a(5,5)
variable         avar=17
variable         x(to)t=10
variable         pi=3.14159927
variable         zz2=25271
variable         zz=100
for-next count   h= 3
string           z$= ""
END OF DUMP
```

Colour Strips
by Stephen Mercer

Vardump

on Spectrum

Last week we inadvertently left out this program by D S Laurence

```
9980 REM Vardump
9981 LET zzz=PEEK 23627+256*PEEK
 23628
9982 LET zz=PEEK zzz
9983 IF zz=128 THEN PRINT "END O
F DUMP": STOP
9984 IF zz>=96 AND zz<=127 THEN
LET zzz=zzz+6: PRINT "variable"
CHR$ zz;"=";VAL (CHR$ zz): GO
TO 9982
9985 IF zz>=160 AND zz<=191 THEN
 PRINT "variable";: LET z$=CHR$
(zz-64): GO TO 9992
9986 IF zz>=128 AND zz<=159 THEN
 PRINT "variable array ";CHR$ (zz
-32);"(";: FOR h=1 TO PEEK (zzz+
3): PRINT PEEK (zzz+2+2*h)+256*PE
EK (zzz+2*h+3);",";: NEXT h: PR
INT ")": LET zzz=zzz+3+PEEK (zzz
+1)+256*PEEK (zzz+2): GO TO 9982
9987 IF zz>=224 AND zz<=255 THEN
 LET zzz=zzz+19: PRINT "for-nex
t count ";CHR$ (zz-128);"=";VAL
(CHR$ (zz-128)): GO TO 9982
9988 IF zz>=64 AND zz<=95 THEN L
ET zzz=zzz+3+PEEK (zzz+1)+256*PE
EK (zzz+2): PRINT "string ";CHR$
(zz+32);"$";"=";VAL$ (CHR$ (
zz+32)+"$"): GO TO 9982
9989 IF zz>=192 AND zz<=223 THEN
 PRINT "string array ";CHR$ (zz-9
6);"$(";: FOR h=1 TO PEEK (zzz+3
): PRINT PEEK (zzz+2+2*h);",";
NEXT h: PRINT ")": LET zzz=zzz+3
+PEEK (zzz+1)+256*PEEK (zzz+2):
GO TO 9982
9990 LET zzz=zzz+5: IF PEEK zzz<
128 THEN LET z$=z$+CHR$ (PEEK z
zz): GO TO 9990
9991 LET z$=z$+CHR$ (PEEK zzz-12
8): PRINT z$;"=";VAL [illegible] z$:
 LET z$="": LET zzz=zzz+6: GO
 TO 9982
```

Vardump
by D S Laurence

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the Program of the Week double our new fee of £6 for each program published.

Editor

on Dragon

The Dragon s Microsoft editor is excellent, but there are two extra commands which the manual doesn t mentdn, these are

- A Refills the edit buffer with the original program line, (this is useful when editing has become confused)
- 'Q Aborts the editor makes no changes to program line and gives OK prompt

Yet another major omission from the Dragon manual is the *Dn Error* message This stands for 'Device Number Error and occurs if the number in an *Open/Close/Eof* command is not 0 −1 or −2 Try *Print Eof*(−7) for example

Peter Chase s article on repeating *Inkeys* is very good (issue 36) but his function which needs a whole subroutine may be reproduced in one line as

```
10 DEF FNA(A) ABS(PEEK(135)*((PEEK(65280)
OR 128)<>255))
```

and may be used by A=FNA(0) where A will equal the Ascii code of any key being pressed A will equal zero if no key is being pressed

It can be annoying when writing programs which require Yes/No answers to have to check for both upper and lower case letters Memory location 329 is the lower case on/off switch. *Poke* 329,0 turns lower case on, *Poke* 329,255 turns it off

Anybody writing machine code programs should find the following notes especially useful

```
165 & 166  Line number of program line currently being
           executed
136 & 137  PRINT@ position in memory ie if PRINT
           position were at 23 PEEK(137)+256
           *PEEK(136) would give 1047
337 to 345 Keyboard check.
426 to 433 Name of file being searched for
434 to 441 Name of file being loaded
274 & 275  Value of TIMER function.
For the PLAY' command
226        TEMPO
225        NOTE DURATION
222        CONTROLS OCTAVE
```

Locations 346 to 349 contain the values of *Joystick*(0) to *Joystick*(3) respectively These may be updated by calling the Rom routine which starts at location 48466 In Basic this would be *Exec*(48466)

Locations 65494 and 65495 are used to alter the CPU speed *Poke* 65495 255 will double the speed to 1 8 MHz *Poke* 65494 255 returns it to its normal speed The Dragon is not designed to run at 1 8 MHz and so I don t really recommend its frequent use in programs Other useful Rom routines that may be called are

EXEC(41166) which will flash the cursor until any key is pressed

EXEC(40889) which will restart BASIC giving the usual (C) 1982 DRAGON DATA LTD message.

Bit 3 of location 65313 controls the cassette relay 1 is on 0 is off Bit 0 of location 65312 is the cassette data input.

Finally, I give below two machine code routines that may be of general use, the first scrolls the Hi-Res screen down by one pixel in *Pmodes* 3 and 4, the second can be used to either invert the whole text screen to white on black or clear the text screen to an Ascii character The routines can be located anywhere in Ram as they contain no absolute jumps etc

```
10 CLEAR 200 31999
20 DATA 142 23 223 16 142 23,255 166,137
   6,0 167 169 6 0 48 23 48 31 164 206 255 40
   229 57
30 FOR I=1 TO 25
40 READ A  POKE 31999+I A
50 NEXT I
```

call by EXEC(32000)

Screen invert/clear:

```
10 CLEAR 200 31999
30 DATA 142 0 0 166 137
   4 0 132 191 167 137 4 0 40 1 164,2,0 37 228 57
34 B=32000  FOR I=0 TO 30  READ A
40 POKE B+I,A
60 NEXT I
```

call by EXEC(B)

To change to screen clear, *Poke* B+7,134 and *Poke* B+8 Ascii of required character These two routines can be used separately or together

Editor
by Brian Cadge

Colour Strips

on Spectrum

This program draws in the right hand bottom corner of the screen, the Spectrum colour stripes It is numbered in such a way as to be easily *Merged* with other programs to provide an extra splash of colour to a title page

The program uses the *Inverse* function by making the yellow and blue stripes from ink colour which has been inverted to paper

As it stands the main paper colour of the page is defined by the variable 'P but this can obviously be altered to suit requirements It may be necessary to change or even delete line 9610 in these circumstances

```
9600 REM © Steve Mercer 1983
9605 LET p=0
9610 BORDER 7  PAPER p  CLS   IN
K 0
9615 LET x=66  LET y=64
9620 FOR n=185 TO 206
9625 PLOT n,0  DRAW x,y
9630 LET x=x-1  LET y=y-1
9635 NEXT n
9640 LET x=60  LET y=58
9645 INVERSE 1
9650 FOR n=206 TO 229
9655 PLOT PAPER 6,n 0  DRAW PAPE
R 6 x y
9660 LET x=x-2  LET y=y-1
9665 NEXT n  INVERSE 0
9670 INK 4  LET x=38  LET y=38
9675 FOR n=217 TO 236
9680 PLOT n 0  DRAW x,y
9685 LET x=x-1  LET y=y-1
9690 NEXT n
9695 INVERSE 1  LET x=26  LET y=
26
9700 FOR n=229 TO 256
9705 PLOT PAPER 1,n,0  DRAW PAPE
R 1,x,y
9710 LET x=x-1  LET y=y-1
9715 NEXT n  INVERSE 0
9720 INK 2  LET x=14  LET y=14
9725 FOR n=241 TO 255
9730 PLOT n 0  DRAW x y
9735 LET x=x-1  LET y=y-1
9740 NEXT n
9745 STOP
```

Colour Strips
by Stephen Mercer

Vardump

on Spectrum

Last week we inadvertently left out this program by D S Laurence

```
9990 REM Vardump
9991 LET zzz=PEEK 23627+256*PEEK
23628
9992 LET zz=PEEK zzz
9993 IF zz=128 THEN PRINT  END O
F DUMP  STOP
9994 IF zz>=96 AND zz<=127 THEN
LET zzz=zzz+6  PRINT "variable"
CHR$ zz, = ,VAL (CHR$ zz)  GO
TO 9992
9995 IF zz>=160 AND zz<=191 THEN
 PRINT  variable  LET z$=CHR$
(zz-64)  GO TO 9998
9996 IF zz>=128 AND zz<=159 THEN
 PRINT "variable array  CHR$ (zz
-96)  (  FOR h=1 TO PEEK (zzz+
3) PRINT PEEK (zzz+2+2*h)+256*PE
EK (zzz+2*h+3),  NEXT h  PR
INT )  LET zzz=zzz+3+PEEK (zzz
+1)+256*PEEK (zzz+2)  GO TO 9992
9997 IF zz>=224 AND zz<=255 THEN
 LET zzz=zzz+19  PRINT "for-next
 count  CHR$ (zz-128), =  VAL
(CHR$ (zz-128))  GO TO 9992
9998 IF zz>=64 AND zz<=95 THEN L
ET zzz=zzz+3+PEEK (zzz+1)+256*PE
EK (zzz+2)  PRINT  string  CHR$
 (zz+32)  $" "=  VAL$ (CHR$ (
zz+32)+ $ )  GO TO 9992
9999 IF zz>=192 AND zz<=223 THEN
 PRINT  string array  CHR$ (zz-9
6  $  FOR h=1 TO PEEK (zzz+3
)  PRINT PEEK (zzz+2+2*h)   ,
NEXT h  PRINT  )  LET zzz=zzz+3
+PEEK (zzz+1)+256*PEEK (zzz+2)
GO TO 9992
9980 LET zzz=zzz+1  IF PEEK zzz
=128 THEN LET z$=z$+CHR$ (PEEK z
zz)  GO TO 9980
9981 LET z$=z$+CHR$ (PEEK zzz-12
8)  PRINT z$  =  VAL  (VAL$   z$
))  LET z$=""  LET zzz=zzz+6  GO
 TO 9992
```

Vardump
by D S Laurence

```
string array    a$(2 4 6 )
string array    b$(20 10 )
variable array  a(5 2 )
variable        a=2
variable        xlimit=10
variable        pi=3 14159927
variable        zzz=23871
variable        zz=160
for-next count  h= 3
string          z$=
END OF DUMP
```

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Alien Shoot

on Vic-20

The object of this game is to shoot the alien who flys across the screen before he lands and takes your base. You use the space bar to fire and your score is shown when the game is over. The variables are R Missile and Q Alien.

Program notes

- 7 to 11 Set up screen and put in the base and ground
- 15 to 100 Get the alien to move and test for firing
- 100 to 149 Get the missile to move and make missile sound
- 130 Checks a hit or not.
- 180 to 204 Make the alien explode and make sounds
- 205 to 400 End the game and give you your score

```
0 POKE36879 27 PRINT"J"
1 PRINT"ALIEN SHOOT"
2 PRINT "SPACE BAR=FIRE"
3 REM **BY MAX ADDIE**
4 FOR1=1TO2000 NEXT
5 PRINT"J"
6 REM SET SCREEN
7 POKE7690 160
8 POKE8130,65
9 FORW=8 4 TO8163 POKEW,160 NEXT
10 POKE8125,102 POKE8135,'02
11 POKE36879 109
12 REM SET ALIEN
13 REM *** *****
14 Q=7790
20 POKEQ 88
30 FORI=1TO10 NEXT
40 POKEQ,32
50 Q=Q+1
52 IFPEEK(Q)=160THEN300
55 GETA$ IFA$=' 'THEN100
60 GOTO20
100 POKEQ,88
103 REM SET LASER
105 P=8098+1)
106 POKE36878,15
107 POKE36876,229
108 FORI 1TO200 NEXT
109 POKE36876,0
110 POKER,33
120 FORJ=1TO10 NEXTJ
130 POKER,32
140 R=R-22
150 IFPEEK(R)<>32THEN180
160 GOTO110
180 IFPEEK(R)=160THEN400
200 POKER,86
201 POKE36878,15
202 POKE36877,147
203 FORI=1TO300 NEXT
204 POKE36877 0
205 PRINT "HIT"
208 FORI=1TO500 NEXT
210 SC=SC+5
220 GOTO5
300 PRINT"YOU HAVE BEEN"
310 PRINT"TAKEN OVER!"
315 PRINT"SCORE="SC
320 FORI=1TO2000 NEXT
330 PRINT"NEW GAME?(Y,N)"
340 INPUTA$ IFA$="Y"THENGOTO5
350 END
400 GOTO20

READY.
READY.
```

Alien Shoot
by Max Addie

Line Drawing

on BBC Micro

This program is written for a BBC micro Model A and makes use of most aspects of line drawing on the BBC e g *Plot*, *Draw*, *Move* and uses Mode 4 for a higher resolution

The pattern includes a solid circle made out of tiny triangles joined together. The other two parts of the program also make use of the Cos,Sin Tan functions

Program notes

- 10 Selects the mode
- 20 Starts the loop for the circular motion
- 30 40 Draws the pattern
- 50 Returns the loop
- 60 See 20
- 70 80 90 Fills in the circle with tiny triangles
- 120 Draws first circle
- 130 140 Draws second circle
- 150 This line is not essential I just put it in to stop the arrow coming up and spoiling the corner pattern

```
1 REM**SIN,COS,TAN DISPLAY
2 REM**IAN S PROGRAM (C)1982
10 MODE 4
20 FOR L=0 TO 2*PI STEP 0,07
30 MOVE 635-200/COS(L)*TAN(L),400+300*SIN(L)*COS
   (L)*TAN(L)
40 DRAW 635,0
50 NEXT L
60 FOR L=0 TO 2*PI STEP 0.04
70 PLOT 4,635,800
80 PLOT 4,635+200*SIN(L),800+200*COS(L)
90 PLOT 85,635+200*SIN(L+0.04),800+200*COS(L+0.04)
100 NEXT L
110 FOR L=0 TO 2*PI STEP 0,06
120 MOVE 0+300*SIN(L),1000+300*COS(L):DRAW 0,1000
130 MOVE 1270+300*SIN(L),1000+300*COS(L)
140 DRAW 1270,1000
150 NEXT L
160 GOTO 160
```

Line Drawing
by Ian Entwistle

Conversion

on ZX81

This program starts off by asking you which subject you want

Equivalents
To Convert
Equivalants (British)

Equivalents tells you metric equivalants eg 1 mm = 0.0394 in

To Convert converts metric to yards feet and inches. You enter the number you want to convert then it works it out and prints it out on the screen

Equivelents (British) tells you British equivalents. On both equivalents there is an option to copy on a printer

If you have not got a printer than take out lines 170 199 767, 770. Lines 100—199 prints out equivalents. Lines 200—239 prints out choices for conversions and lines 300—700 works out the conversion and prints the answer on the screen

```
2 LLIST
5 CLS
10 PRINT AT 0 7 "MEASURE"
11 PRINT AT 1
12 PRINT
13 PRINT
20 PRINT "1 EQUIVALENTS (METRIC)"
22 PRINT
24 PRINT "2 TO CONVERT"
25 PRINT
26 PRINT "3 EQUIVALENTS (BRITISH)"
30 PRINT AT 19,1 "ENTER 1 2 OR 3"
32 INPUT A$
34 IF A$="1" THEN GOTO 100
35 IF A$="2" THEN GOTO 200
36 IF A$="3" THEN GOTO 700
100 CLS
110 PRINT "METRIC EQUIVALENTS"
112 PRINT
114 PRINT AT 0 [illegible]
115 PRINT
120 PRINT
130 PRINT "1 MM = 0.0394 IN"
140 PRINT "1 CM = 10 MM =0.3937 IN"
150 PRINT "1 M =100 CM =1.0936 YDS"
160 PRINT "1 KM =1000 M =0.6214 MILE"
170 PRINT AT 12 1 "TO COPY PRESS C"
180 PRINT AT 13 1 "PRESS M TO GO BACK TO MENU"
190 INPUT A$
195 IF A$="M" THEN GOTO 5
199 IF A$="C" THEN COPY
200 CLS
210 PRINT "TO CONVERT"
220 PRINT
221 PRINT
222 PRINT "ENTER"
223 PRINT
224 PRINT "1 MILLIMETRES TO INCHES"
225 PRINT "2 METRES TO FEET"
226 PRINT "3 METRES TO YARDS"
230 PRINT "4 KILOMETRES TO MILES"
232 PRINT "5 INCHES TO MILLIMETRES"
234 PRINT "6 FEET TO METRES"
235 PRINT "7 YARDS TO METRES"
236 PRINT "8 MILES TO KILOMETRES"
237 PRINT
238 PRINT "NUMBER"
```

Continued on page 18

Continued from page 17

```
239 INPUT A$
240 IF A$="1" THEN GOTO 300
245 IF A$="2" THEN GOTO 320
250 IF A$="3" THEN GOTO 340
255 IF A$="4" THEN GOTO 360
260 IF A$="5" THEN GOTO 380
265 IF A$="6" THEN GOTO 400
270 IF A$="7" THEN GOTO 420
275 IF A$="8" THEN GOTO 440
300 CLS
302 PRINT "MILLIMETRES TO INCHE
S"
304 PRINT
305 PRINT "ENTER MILLIMETRES?"
308 INPUT B
310 PRINT AT 4,0;B
312 PRINT AT 4,8;B*0.0394
313 PRINT AT 16,1;"ENTER D TO D
O MORE"
315 PRINT AT 17,1;"ENTER M FOR
MENU"
317 INPUT A$
318 IF A$="D" THEN GOTO 300
319 IF A$="M" THEN GOTO 5
320 CLS
321 PRINT "METRES TO FEET"
322 PRINT
323 PRINT "ENTER METRES?"
324 INPUT B
325 PRINT AT 4,0;B
326 PRINT AT 4,8;B*3.2808
327 PRINT AT 16,1;"ENTER D TO D
O MORE"
328 PRINT AT 17,1;"ENTER M FOR
MENU"
329 INPUT A$
330 IF A$="D" THEN GOTO 200
331 IF A$="M" THEN GOTO 5
340 CLS
341 PRINT "METRES TO YARDS"
342 PRINT
343 PRINT "ENTER METRES"
344 INPUT B
345 PRINT AT 4,0;B
346 PRINT AT 4,8;B*1.0936
347 PRINT AT 16,1;"ENTER D TO D
O MORE"
348 PRINT AT 17,1;"ENTER M FOR
MENU"
349 INPUT A$
350 IF A$="D" THEN GOTO 300
351 IF A$="M" THEN GOTO 5
360 CLS
361 PRINT "KILOMETRES TO MILES"
362 PRINT
363 PRINT "ENTER KILOMETRES"
364 INPUT B
365 PRINT AT 4,0;B
366 PRINT AT 4,8;B*0.6214
367 PRINT AT 16,1;"ENTER D TO D
O MORE"
368 PRINT AT 17,1;"ENTER M FOR
MENU"
369 INPUT A$
370 IF A$="D" THEN GOTO 200
371 IF A$="M" THEN GOTO 5
380 CLS
381 PRINT "INCHES TO MILLIMETRE
S"
382 PRINT
383 PRINT "ENTER INCHES?"
384 INPUT B
385 PRINT AT 4,0;B
386 PRINT AT 4,8;B*25.4
387 PRINT AT 16,1;"ENTER D TO D
O MORE"
388 PRINT AT 17,1;"ENTER M FOR
MENU"
389 INPUT A$
390 IF A$="D" THEN GOTO 200
391 IF A$="M" THEN GOTO 5
400 CLS
401 PRINT "FEET TO METRES"
402 PRINT
403 PRINT "ENTER FEET?"
404 INPUT B
405 PRINT AT 4,0;B
406 PRINT AT 4,8;B*0.3048
407 PRINT AT 16,1;"ENTER D TO D
O MORE"
408 PRINT AT 17,1;"ENTER M FOR
MENU"
409 INPUT A$
410 IF A$="D" THEN GOTO 200
411 IF A$="M" THEN GOTO 5
420 CLS
421 PRINT "YARDS TO METRES"
422 PRINT
423 PRINT "ENTER YARDS?"
424 INPUT B
425 PRINT AT 4,0;B
426 PRINT AT 4,8;B*0.9144
427 PRINT AT 16,1;"ENTER D TO D
O MORE"
428 PRINT AT 17,1;"ENTER M FOR
MENU"
429 INPUT A$
430 IF A$="D" THEN GOTO 200
431 IF A$="M" THEN GOTO 5
440 CLS
441 PRINT "MILES TO KILOMETRES"
442 PRINT
443 PRINT "ENTER MILES?"
444 INPUT B
445 PRINT AT 4,0;B
446 PRINT AT 4,8;B*1.6093
447 PRINT AT 16,1;"ENTER D TO D
O MORE"
448 PRINT AT 17,1;"ENTER M FOR
MENU"
449 INPUT A$
450 IF A$="D" THEN GOTO 200
451 IF A$="M" THEN GOTO 5
700 CLS
701 PRINT "BRITISH EQUIVALENTS"
710 PRINT
720 PRINT "[illegible]"
721 PRINT
723 PRINT "1 IN
= 2.54 CM"
725 PRINT "1 FT      =12 IN
= 0.3048 M"
730 PRINT "1 YD      =3 FT
= 0.9144 M"
735 PRINT "1 ROD     =5.5 YDS
= 5.0292 M"
740 PRINT "1 CHAIN   =22 YDS
= 20.117 M"
745 PRINT "1 FURLONG=220 YDS
= 201.17 M"
755 PRINT "1 MILE    =1760 YDS
= 1.6093 KM"
760 PRINT "1 NAUTICAL MILE
=6080 FT "
765 PRINT "    = 1.8532 KM"
766 PRINT
767 PRINT "ENTER C TO COPY"
768 PRINT "ENTER M FOR MENU"
769 INPUT A$
770 IF A$="C" THEN COPY
790 IF A$="M" THEN GOTO 5
```

Conversion
by L Maudsley

Break Kay Disable

on ZX81

When using *Inkey$* to input data in a program, if *Break* is pressed (eg by a computer-ignorant user), the program will break which may cause chaos if the user continues to press keys. This Machine Code program prevents the *Break* functioning while allowing the user to enter a space.

It also has other useful effects. The program replaces

```
10 PAUSE 40000
20 LET A= CODE INKEY$
```

with

```
10 LET A = USR 16514 (or whatever address it is stored at)
```

The advantages are that pressing *Break* returns '0', so it is mug-proof. It only uses one line of Basic to call it. It is flicker free in use (unlike *Pause*) and it returns with the code of the key pressed, therefore

```
10 PRINT CHR$ (USR 16514 + 128)
```

will print the inverse of the key pressed.

The disadvantages are that it is slower(!) than Basic and it only works in *Slow* if you wish to retain the display (unlike *Pause*).

When used in a long program, it is an advantage to

```
10 LET K = 16514
60 PRINT USR K (or whatever)
```

Other uses are

```
MENU
20 GOTO (USR K - 36) * 1000
or
20 DIM A (10)
30 LET A(1) = 1210 (ie line no of option "1")
40 LET A(2) = 2340 (ie "2")
MENU
50 GOTO A(USR K)
```

It uses 30 Bytes, and can be stored anywhere in Ram. If it is stored in a *Rem* statement at Line 1 then it is called by *Usr* 16514 (or K = 16514). Any suitable Machine Code loader may be used.

Machine Code Listing

Decimal	*Hex*	*Comment*
205	CD	
187	BB	
2	02	Wait for key to be released
44	2C	
32	20	
250	FA	
205	CD	
187	BB	Wait for key to be pressed
2	02	
68	44	Load BC with corresponding number
77	4D	
81	51	
20	14	Find character corresponding to the number now in BC and load its character code into HL.
40	28	
247	F7	
205	CD	
189	BD	
7	07	
78	4E	
6	06	Load this number into BC and push it onto the stack
0	00	
197	C5	
205	CD	
187	BB	
2	02	Wait again for key to be released
44	2C	
32	20	
250	FA	
193	C1	Pop BC and return to Basic.
201	C9	

Break Key Disable
by A S Thornton

Patterns

on Dragon

This is a program for drawing patterns of a regular nature on a Dragon 32. In its present listing it draws patterns in three colours on a buff background. However, it can easily be adapted to draw in a higher resolution black lines on a buff background.

Program notes

10 doubles the normal speed of the computer
20-50 set up the screen and allocate values to the several variables in use
70 plots the point on the screen
80 changes the value of x and y by either 1 or −1
90-100 check that the next point to be set lies within the parameters of the screen
110 provides the opportunity to have another pattern without having to break out of the program. Pressing any key will automatically cause the program to start again
60 and 120 allow 10 points to be set without the colour altering, allowing the separate colours to be seen clearly
130 starts the cycle again this time in a different colour

The resolution and colours of the screen can be altered easily, for example to draw black on buff in high resolution, delete lines 50, 60 and 140 and change line 10 to pmode 4, line 70 — replace c with 5 and line 150 *Goto* 70

```
10 Poke 65495,0
20 Pmode3 Screen1,1 Pcls
30 A=1 B=1
40 X=Rnd(256) Y=Rnd(192)
50 C=Rnd(3)+5
60 For Z=1to5
70 Pset(X,Y,C)
80 X=X+A:Y=Y+B
90 If X>255 or X<1 Then A=-A
100 If Y>192 or Y<1 Then B=-B
110 If Inkey$<>"" Then Run
120 Next Z
130 Goto50
```

Patterns
by Philip Magurn

Number Puzzle

on Spectrum

The object of this game is to rearrange the numbers in the grid back into their correct numerical sequence reading either across or down. A score is kept of how many moves you make.

Program notes

Lines

5	Sets up colours (personal choice)
4050 to 4060	Instructions
5050 to 5100	Draw Grid and set up start position. Because of the possibility of producing a random start position that could not be solved I have created three start positions stored in Q$ at lines 8000, 8050 and 8100. These positions were found by mixing up a completed grid using legal moves. Then reading left to right going down the grid the numbers were recorded then stored in Q$. Q$ may be changed but only by a sequence found using the method described.
240 to 300	Generate the user definable characters (A B C D). This is used every time a number is moved, as each number is regenerated before every move.
1040 to 1034	Restore Data to relevant position. Position depends on number to be moved.
1040 to 1070	Detect empty square
1205 to 1240	Produce move. Blank out old position and reprint new position
9000 to 9074	Data. To generate the 15 enlarged numbers
8000 to 8020	End routine.

There are no mug traps in the move section of the program, so always move towards the blank square. Movement is via the curser keys.

The following DATA statements are not too clear on the printout:

```
816 DATA 24 24,24,24 24 24 24 24
826 DATA 1 3 8 12 24 24 27 31
827 DATA 128 0 0 0 0 0 224 248
828 DATA 24 24 24 24 24 24 15 7
829 DATA 24 24,24 24 24,24 248 224
831 DATA 31 31 0 0 0 0 1 1
832 DATA 248,248 24 48 96 192,128 128
834 DATA 128 128 128 128 128 128 128 128
861 DATA 48 48 112 112 240 240 48 48
862 DATA 124 254 131 131 3 3,7 62
```

PRESS P-PRINT SCREEN, C-CONTINUE

Number Puzzle
by John Crawford

Generetor

on Vic

This program generates another program, which, when run, adds a new word to Basic. The new word is 'OLD and its function is to recover a program which has been 'NEWED. To achieve this just type OLD. (This program must be loaded first.)

The program listed is the Basic loader. When run, it checks the data and gives error reports providing that the line numbers and number of data elements per line are not changed (*Rems* may be left out). The program then automatically loads the machine code into memory. The machine code is then tagged on to the end of another program one third of the length of the loader.

Note that the loader is lost at this stage and so must be saved first. Finally save the program now in memory. This is the working copy. When run, this final program relocates the machine code to the top of available memory and lowers the pointers so no Basic program can touch it. It then breaks chargot to set up the new keyword. The programs both adjust to run on any configuration of Vic20.

```
0 REM*****************
2 REM D  MCINTYRE  *
4 REM13 KING STREET*
6 REM  KIRKCALDY.  *
8 REM*****************
10 FOR LP = 0 TO 200 STEP 15
20 FOR CT = 0 TO 14
30 READ A  POKE(6400+LP+CT) A  CHK = CHK + A
40 NEXT CT
50 READ SUM
60 IF SUM <> CHK THEN PRINT"DATA ERROR IN LINE"(LP/1.5)+90  END
70 CHK = 0  NEXT LP
80 PRINT"OLD  PROGRAM NOW IN  MEMORY" SYS6400
90 DATA 169 46 160 25 130,251 138 252 160,2 177 251,149 43 200 2156
100 DATA 208 249,165 44 133 46 165 43,105 233,144,2 230,46 133,1280
110 DATA 43 160 86,141 208 25,32,162 35 169 196 72,168 115,72 1697
120 DATA 76 96 150 10 0 158,40,194 46 52,52,41 172 60,52,1232
130 DATA 56,170 194 48 52 51,41-170.51,48 41 38 162 0 0 1132
140 DATA 0,163 58,58 233,140 176 2 198 50,133,55 160,44 132 1613
150 DATA 232,108 83 34 165 84,144 2 230 292 129,251 168 140 136 2129
160 DATA 0,177 251,165 95,40 200,247,169 33,132 117,163,55 133 1230
170 DATA 110 165 56 133 119 163 234,130,130 98 200,2,230,170 169 2871
180 DATA 98 201 255 200 1,96,173,8,2 201 79 200 240 173.1.1898
190 DATA 2,201,78 200,241,173,2,8 201 60 208 298 134 233,130 2158
200 DATA 236,165,43 133 251,165 44 133 252 160 3 200 177 251 240,2471
210 DATA 7,132 91 208 247 164 234 96 152 56 101 251 144 2 230 2198
220 DATA 252 133,251 160,0 160 251 145 43,195 232 200 145 43,160 2365
230 DATA 9 177 251 170 200,177 251 230 0 200 6 134 251 130 250.2466
240 DATA 200 230 201 0 230 246 163 251 29 108 2 144 2,230 253 2276
250 DATA 133 251 130,45 133 87 150 45 165 232 133 46 120 48 133 1834
260 DATA 58 165 55 133,51 165,58,133,52 166,253,164 234 169 2 1868
270 DATA 130 122,160,58 141 2.2 96 0 0 0 0 0 0 0 723
READY
```

Generator
by David McIntyre

Mutant Wars

on BBC Micro

Mutant Wars is an arcade-type game which is fast, flicker-free and very addictive. The screen shows the players score and the number of waves encountered. The idea of the game is to stop the Mutants from reaching Earth by shooting them as they jump down through the atmospheric layers.

The controls are

Z Left
X Right
SHIFT Fire

The program runs so fast because of the speed of BBC Basic, the use of multi-statement lines and the use of the VDU commands instead of *Colour* for example. The program takes up 5 5K in Mode 6 and will run on both models. I chose mode 6 because it allows user definable graphics with the minimum of memory loss.

The program works by scrolling 38 individual text windows, each containing a mutant. This is why it'is so flicker-free.

A special feature of the BBC micro allows the player to fire whilst still moving. This is done in line 490, where −1 is the special number of the shift key.

Program notes

Line	
90	Sets up the error trap
110	Moves the TV picture down one line
120 to 130	Change the repeat and delay on all keys for smooth movement.
140	Stops editing cursor from spoiling display if cursor keys are depressed
150	Change display to mode 6
170	Define envelope for mutants moving.
180	Initialise most of variables.
190	Remove cursor and define characters
210	Clears screen prints title changes foreground and background colours
220 to 280	Calls procedures to play game

List of procedures

PROCT(T)	Used as time delay
PROCGAME	Contains main loop and is base to call most of the other PROCS
PROCBASE	Controls the movement of the laser base
PROCSPACE	Rubs out laser base
PROCFIRE	Displays bullet and checks for hit.
PROCEND	Called when player is invaded. This procedure also calls the invasion tune
PROCSTART	Sets up new screen and increases the difficulty level
PROCTUNE	Plays "Song Song blue" when invaded
PROCHIT	Called when an alien is hit. Adds to the score and displays new score

PROGRAM OF THE WEEK

```
10 REM ****************
20 REM *              *
30 REM * MUTANT WARS  *
40 REM *              *
50 REM * by A.HYNES   *
60 REM *              *
70 REM ****************
80 REM
90 ON ERROR GOTO 580
100 REM
110 *TV 255,0
120 *FX 12,1
130 *FX 11,1
140 *FX 4,1
150 MODE 6
160 REM
170 ENVELOPE 1,1,-26,-36,-45,255,255,255,127,0,0,0,126,0
180 DIM SX(39):BIF=0:BX=20:BY=24:BX1=20:SCORE=0:B=0:WAVE=0:B$=STRING$(40,  ')
190 VDU 23;8202;0;0;0;23,255.195,36,126,219,126,195,126,165.23,225,90,60,231,36,
126,90,66,231
200 REM
210 PRINT TAB(8,11);"HERE COME THE MUTANTS":PROCT(300):VDU 12,19,1,4,0,0,0,19,0,
7,0,0,0
```

```
220 SOUND 1,1,1,1
230 PROCSTART
240 PROCGAME
250 GOTO 230
260 END
270 REM
280 DEFPROCT(T):TIME=0:REPEAT UNTIL TIME>T:ENDPROC
290 REM
300 DEFPROCGAME:KILL=0
310 FOR X=1 TO 38
320 IF BX(X+1)=0 AND (X/3=INT(X/3)):PROCBASE:GOTO 390
330 IF BX(X+1)=0 GOTO 400
340 PROCBASE
350 IF B=1 THEN PROCFIRE
360 IF RND(1)>.85 THEN 390
370 PROCT(10-DIF)
380 VDU 28,X,23,X,1,30,11,26:BX(X+1)=BX(X+1)+1:IF BX(X+1)=23 THEN PROCEND
390 IF BX1<>BX:PROCSPACE
400 IF B=1 THEN PROCFIRE
410 NEXT
420 IF KILL>=38 THEN 440
430 X=38:GOTO 310
440 ENDPROC
450 REM
460 DEFPROCBASE:*FX 15,1
470 PRINT TAB(BX,BY);CHR$(225);
480 RESP$=INKEY$(5)
490 IF INKEY(-1)=-1 AND B=0:BLX=BX:BLY=BY:B=1:SOUND 3, 15,200,3
500 IF RESP$="Z" THEN BX=BX-1:IF BX<1 THEN BX=1
510 IF RESP$="X" THEN BX=BX+1:IF BX>38 THEN BX=38
520 ENDPROC
530 REM
540 DEFPROCSPACE
550 PRINT TAB(BX1,BY);" ";
560 BX1=BX:ENDPROC
570 REM
580 MODE 7:IF ERR<>17:REPORT:PRINT' at line ';ERL
590 *FX 12,0
600 *FX 4,0
610 SOUND 1,0,0,1:END
620 REM
630 DEFPROCEND:PRINT TAB(0,10);S$;TAB(0,11);S$;TAB(0,12);S$;TAB(15,11);"GAME OVE
R"
640 SOUND 0,-15,60,10:SOUND 1,0,0,1:PROCT(40):PROCTUNE
650 PROCT(250):VDU28,0,24,39,1,12,20:PRINT TAB(8,10);"Press SPACE bar to play":*
FX 15,0
660 REPEAT UNTIL GET$=" "
670 RUN
680 REM
690 DEFPROCFIRE:VDU 28,BLX,23,BLX,BLY-1,12,26:BLY=BLY-1:PRINT TAB(BLX,BLY);"!";,
700 IF BX(BLX+1)>=BLY:PROCHIT:GOTO 720
710 IF BLY<3:VDU 28,BLX,23,BLX,2,17,26:BX(BLX+1)=0:B=0
720 ENDPROC
730 REM
740 DEFPROCSTART
750 WAVE=WAVE+1:DIF=DIF+2:IF DIF>16 THEN DIF=16
760 FOR X=1 TO 38:Y=RND(DIF)+2:BX(X+1)=Y:PRINT TAB(X,Y);CHR$(255):NEXT
770 VDU 17,129,17,0:PRINT TAB(0,0);S$;TAB(2,0);"SCORE ";SCORE;TAB(29,0);"WAVE ";
WAVE:VDU 17,1,17,128
780 ENDPROC
790 REM
800 DATA 69,24,53,24,81,24,73,6,69,2,61,6,53,2,61,8,81,24
810 REM
820 DEFPROCTUNE
830 FOR S=1 TO 9:READ F,E
840 SOUND 2,-15,F,E:SOUND 2,0,0,2:NEXT
850 ENDPROC
860 REM
870 DEFPROCHIT
880 SCORE=SCORE+10:VDU 28,BLX,23,BLX 2,12,26,17,0,17,129:PRINT TAB(8,0);SCORE
890 BX(BLX+1)=0:VDU 17,1,17,128:B=0:SOUND 0,-15,60,2:KILL=KILL+1
900 ENDPROC
```

Mutant Wars
by Alan Hynes

Battlestar

Preliminary Results

The first phase of **Battlestar**, *Popular Computing Weekly's* unique computer moderated, play-by-mail, space adventure game has now closed. The names of the 245 players winning through are now being sorted. They will all shortly receive a voucher giving them £10 off a ZX Printer.

Most of you had little difficulty in answering the questions correctly. For the few who got some of them wrong, here are the answers.

1) **Harrison Ford** played Han Solo in *Star Wars* and Deckard in *Blade Runner*
2) **The Empire Strikes Back** was the sequel to *Star Wars*
3) In the film *Tron* the letters MCP stood for **Master Control Program**
4) The two robots in *Star Wars* were called **R2D2** and **C3PO**
5) *ET* was trying to 'phone **home**

More news on **Battlestar** next week, as the first round in space begins.

The Cruising Competition

£10 is the prize each month for the highest score on Cruising, the new machine code game from Solarsoft for the ZX Spectrum.

The entries for each month should arrive at the *Popular Computing Weekly* offices at least five working days before the end of the month. Entries for March therefore should arrive here by 22 February.

Each entry should be accompanied by a print out of the high score, using the special printer routine and code number generated by each game. No High Score can win more than once.

To give you something to aim for, here are our best scores so far:

1) *Duncan Scot* **2264**
2) *Brendon Gore* **1806**
3) *David Kelly* **346**

Two aspects of coding

Geoff Wilkins shows two machine-code routines for the Spectrum

Here are two short machine-code routines for the Spectrum that do nothing useful at all except to demonstrate some essential aspects of coding the machine. These are *reading the keyboard printing on the screen, controlling the colours* (by two different methods) coding the *user-defined characters,* and *moving the print-position* — with particular regard to differences between the Spectrum and the ZX80/81.

The first routine can easily be loaded to addresses 32256 to 32310 with the following Basic loader-program:

```
10 CLEAR 32255
20 FOR A=32256 TO 32310
30 READ N: POKE A,N
40 NEXT A
50 DATA 205 36 126 135 135 135
50 143 92 6 32 62 32 215 16 251
205 36 126 79 58 143 92 129 50
143 92,6 8 62 217 215 16 251,24
220
60 DATA 151 50 8 92 58 8 92,254
0 40 249 214 48 167,254 8 48 238
201
```

If you've already got your own hex-loader for the Spectrum, the hex-code is:

```
7E00  CD247E
7E03  87
7E04  87
7E05  87
7E06  328F5C
7E09  0620
7E0B  3E20
7E0D  D7
7E0E  10FB
7E10  CD247E
7E13  4F
7E14  3A8F5C
7E17  81
7E18  328F5C
7E1B  0608
7E1D  3ED9
7E1F  D7
7E20  10FB
7E22  18DC
7E24  97
7E25  32085C
7E28  3A085C
7E2B  FE00
7E2D  28F9
7E2F  D630
7E31  A7
7E32  FE08
7E34  30EE
7E36  C9
```

Once you've loaded the code, enter the command NEW and then the line

```
PRINT USR 32256
```

Run this, and you should confront a blank screen. Nothing will happen unless you press one of the numeral-keys 0-7. The first such key you press will produce a line of spaces in the appropriate *Paper* colour on the screen, the next will produce a line with the same *Paper* colour, but with the word *Ink* printed eight times in the new key's *Ink* colour. The next key will produce a line in a new *Paper* colour, and so on.

This is a disassembled listing of the program:

```
Address  Instruction
32256    CALL 32292
32259    ADD A,A
32260    ADD A,A
32261    ADD A,A
32262    LD (23695),A
32265    LD B,32
32267    LD A,32
32269    RST16
32270    DJNZ —5
32272    CALL 32292
32275    LD C,A
32276    LD A,(23695)
32279    ADD A,C
32280    LD (23695),A
32283    LD B,8
32285    LD A,217
32287    RST16
32288    DJNZ —5
32290    JR —36
32292    SUB A,A
32293    LD (23560),A
32296    LD A,(23560)
32299    CP 0
32301    JR Z —7
32303    SUB A,48
32305    AND A
32306    CP 8
32308    JR NC —18
32310    RET
```

The program starts by calling a sub-routine at address 32292. This is a *Keyboard Read* routine. It uses the system variable *Last K* at address 23560, which stores the code of the last-pressed key. The sub-routine Pokes zero into this address — the Spectrum has no character for code zero — and then goes into a loop which only breaks when *Last K* gets a value other than zero.

When such a value has been found, addresses 32303 to 32309 subtract 48 from *Last K* — 48 being the difference between 0—7 and *Code* '0 —*Code* 7. If the result is more than 7 — ie if any key had been pressed other than the numeral-keys 0—7 — the sub-routine jumps back to its start, otherwise, it returns to the main routine, with a value 0—7 in the A register.

The principle of this use of the system variable *Last K* can be used in any routine that needs to read the keyboard and transfer information from keys pressed into a register — this, of course, is the machine-code equivalent of *Inkeys* in Basic. (The *Inkeys* function is in fact easier to reproduce in machine code than the *Input* function.)

The next addresses, 32259 to 32264, multiply the A-register value by 8, and load the result into address 23695. This is the system variable *Attr T* storing values for 'temporary current colours'.

Both this system variable and the system variable *Attr P* for 'permanent current colours', at address 23693, store values for colours in the same way: bit 7 stores 0 or 1 for *Flash*, bit 6 stores 0 or 1 for *Bright*, bits 5 to 3 store 0—7 for *Paper*, and bits 2 to 0 store 0—7 for *Ink*.

Thus by multiplying the A-register value by 8 and then poking it into *Attr T* we are altering the temporary *Paper* colour according to the value 0—7 in the A-register.

Addresses 32265 to 32271 print a space (code 32) of *Paper* colour 32 times. As the manual tells us, because of the Spectrum's more complex display-file, one can not poke directly on to the screen as easily as with the ZX80/81. Fortunately, the machine-code instruction "*Rst16*" works just as well on the Spectrum, printing the character whose code is in the A-register at the next print-position.

Addresses 32272 to 32282 call the *Keyboard Read* sub-routine again, and then add the returned A-register value 0—7 unmodified to the value in the *Attr T* system variable. This has the effect of changing the temporary *Ink* colour while leaving the *Paper* colour unchanged.

Addresses 32283 to 32289 print the character with code 217 — *Ink* — eight times across the screen in the new *Ink* colour on the unchanged *Paper* colour.

Finally addresses 32290 to 32291 jump

back to the start of the routine The program will continue, with no chance of breaking out, until you fill the screen and elicit the 'scroll?' query In the present program pressing the N -key at this point is a handy way of getting back to Basic But often in both Basic and machine-code programs the 'scroll? is just a nuisance You can get rid of it in machine code as in Basic by poking the system variable at address 23692 In the present program simply replace

```
  32310    201   RET
by
  32310    245   PUSH AF
  32311     62   LD A,255
           255
  32313     50   LD (23692),A
           140
            92
  32316    241   POP AF
  32317    201   RET
(Hex-code is
  7E36   F5
  7E37   3EFF
  7E39   328C5C
  7E3C   F1
  7E3D   C9 )
```

This will get rid of 'scroll?', but now, the only way of stopping the program is by pulling out the plug Of course using the *Keyboard Read* sub-routine, it would be easy to include a means of breaking but within the routine — e g by pressing the space-key

What happens if we change our Basic line

```
10 PRINT USR 32256
```

to

```
10 RANDOMIZE USR 32256
```

On the ZX80/81 that would make no difference to the program like this It does not of itself return to Basic but with the Spectrum you'll find that the colour-lines print upwards from the bottom two lines of the screen, and soon produce an "Out of screen" error-report.

Print Usr works perfectly well with the present program but sometimes you won't want to use it because, on return to Basic it will print the value of the BC-register to the screen You can get round this problem by using

```
PRINT  RANDOMIZE USR (address)
PRINT  LET A=USR (address)
```

and so on

The second routine might be the start of a machine-code Space Invaders program You can use the same loader program as before changing line 20 to

```
20 FOR A=32256 TO 32326
```

and changing the DATA-lines to

```
  60 DATA 195 36 60 90 126 24 24 102
0 0 0 0 28 62 127 127
  70 DATA 1 16 0 33 0 126 17 64 127
237 176
  80 DATA 62 16 215 62,2,215 62,22,
215 62 10 215 62 0 215
  90 DATA 6 16 62 144,215 62 32 215
16 248 62 16 215 62 1 215 62 22,215
62,21 215 62 0 215 62 145 215 201
```

Here s the hex-code listing

```
7E00   C3243C
7E03   5A
7E04   7E
7E05   1818
7E07   66
7E08   00
7E09   00
7E0A   00
7E0B   00
7E0C   1C
7E0D   3E7F
7E0F   7F
7E10   011000
7E13   21007E
7E16   11407F
7E19   EDB0
7E1B   3E10
7E1D   D7
7E1E   3E02
7E20   D7
7E21   3E16
7E23   D7
7E24   3E0A
7E26   D7
7E27   3E00
7E29   D7
7E2A   0610
7E2C   3E90
7E2E   D7
7E2F   3E20
7E31   D7
7E32   10F8
7E34   3E10
7E36   D7
7E37   3E01
7E39   D7
7E3A   3E16
7E3C   D7
7E3D   3E15
7E3F   D7
7E40   3E00
7E42   D7
7E43   3E91
7E45   D7
7E46   C9
```

Here's the routine disassembled from address 32272, this is because the first 16 addresses, 32256—32271, hold data for the user-defined graphics, and would be meaningless disassembled

```
32272   LD BC 16
32275   LD HL 32256
32278   LD     32600
32281   LDIR
32283   LD A,16
32285   RST 16
32286   LD A,2
32288   RST 16
32289   LD A,22
32291   RST 16
32292   LD A,10
32294   RST 16
32296   LD A,0
32297   RST 16
32298   LD B,16
32300   LD A,144
32302   RST 16
32303   LD A,32
32305   RST 16
32306   DJNZ —8
32308   LD A,16
32310   RST 16
32311   LD A,1
32313   RST 16
32314   LD A,22
32316   RST 16
32317   LD A,21
32319   RST 16
32320   LD A,0
32322   RST 16
32323   LD A,145
32325   RST 16
32326   RET
```

You can run this with the command

```
CLS  PRINT  RANDOMIZE USR 32272
```

This should produce a row of red space-invaders about halfway down the screen, and a blue defender at the bottom

Addresses 32272—32281 *Poke* the data from the routine s first 16 addresses into the first 16 addresses of the Spectrum s user-defined graphics, 32600—32615 (Note these latter addresses apply only to the 16K Spectrum on the 48K model the user-defined graphics start at address 65368 — so you need to change address 32280 in the routine to 255 instead of 127 (hex address 7E18 to FF instead of 7F)) This data is of course for the space-invader and the defender

The rest of the routine is almost entirely taken up with instructions to load the A-register with different values and then print by the Instruction RST 16 However these instructions don t just print characters on the screen — they also serve to alter the colours and the print position If you look in chapters 15 and 16 of the Spectrum manual, you ll see that characters 6 to 23 of the character set can be printed in various combinations and with numeral-characters to alter the print-position colour, brightness flash etc The good news is that you can do the same in machine-code — which is quite a substantial compensation for the difficulties in poking directly into the Spectrum s display file

I ll leave it to you to work out, by referring to the manual s chapters how the different machine code instructions in the routine alter colour and print position and to experiment with the many other possibilities (My routine could have been much more neatly written by putting the characters to be printed into a data-list I ll leave you to try that as well) If you go further and use the *Keyboard Read* sub-routine from the first routine you can think about moving characters both on their own and via the keyboard — and then you re well on your way to a genuine "Space Invaders program!

Finally as a pendant to my piece on redefining the Spectrum keyboard in *PCW* no 24 (30 September 1980) here s a little novelty that produces an '*Australian Keyboard*'

```
10 CLEAR 31743
20 FOR A=15616 TO 16383 STEP 8
30 FOR N=0 TO 7
40 POKE A+16129+N PEEK (A+8-N)
50 NEXT N NEXT A POKE 23607 123
```



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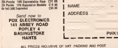
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Specifying corners

David Lawrence continues his commentary on lines 2060-2180 of Module 5 of his Characters program

On calling up this section by the use of the 'M' key in the previous module the user is asked to specify a corner. If corner four is specified then a rectangle is defined with two opposite corners consisting of grid corner 1 (the corner opposite four) and the current position of the cursor. This rectangle is then moved so that the corner defined by the cursor is relocated in grid corner 4. This may sound complex but a little experimentation will show that it is in fact a neat and simple means of moving the contents of the grid around. It is important to remember that if the design is to be moved down two lines, the bottom two lines of the design will be lost and similarly for moves in other directions.

2070 This line draws a large 'M' next to the grid to show that the move function has been called — it seemed like a good idea at the time. The empty loop in this line serves the important function of separating the input named T$ in the previous module and one called T1$ which is about to be called for. Without this delaying loop there is a danger that if the user's finger lingers on the 'M' key when calling up this function, the *Inkeys* function at line 2090 will define T1$ as 'M' too. This delay is necessary whenever using a succession of *Inkeys* inputs.

2080 MX and MY are the variables which will be used to record the distance the defined rectangle must be moved. X1, Y1, X2 and Y2 will record the opposite corners of the defined rectangle.

2100-2130 These variables are set according to the corner specified as the destination of the move and the current position of the cursor. Again for no particular reason, the number of the corner chosen as a destination is drawn next to the grid.

2140 If an erroneous input is made when the program is expecting a corner to be specified, the 'M' is erased and control is returned to Module 4.

2150-2170 Having established the size of the rectangle to be moved and the amount of movement necessary, these values are divided by four so that they can be applied to the array A and the transformation accomplished in transferring the contents to the array B.

Testing

The three functions specified in the commentary should now be available.

Module 6 *Lines 3000-3300*

Having established the functions necessary to define and manipulate a character on the grid, we come to the heart of the program, the module which takes the design which the user has created and transforms it into a string which, when DRAWn, will reproduce the desired character or design.

Commentary

3030 Since elements in the design will be erased from the array as they are incorporated into the string, the process is actually carried out on a copy of the main array.

3040 The letters contained in DI$ are the eight directions which can be handled by the *Draw* command. E$ will contain the string defining the design or character.

3050 X and Y are used to register coordinates on the grid. D1 and D2 are used to record the vertical and horizontal elements of the direction in which a line is currently being *Drawn*.

3060 and 3250 The loop defined by these two lines scans through the grid, ignoring empty squares.

3070-3120 For reasons that will be seen later, the fact that program execution has arrived at this point shows that the square currently defined by I and J is inked in but that it does not follow on in a continuous line from any part of the design previously recorded in E$. The location of the square is therefore recorded in the form of a B(lank) M(ove) within the string. The first square to be recorded in this fashion will always be the top left-hand square in the design and its position will be defined in relation to the top left-hand corner. Other squares to be recorded in the BM format will be defined in relation to wherever *Drawing* last left off. The drawing position is updated to the current square and the square is erased so that it cannot figure twice in the design.

3130 If the element at Y+D1,X+D2 is not zero, then since D1 and D2 contain the direction in which a line is currently being drawn, the loop examining surrounding squares is jumped around.

3140-3170 If a current direction cannot be continued, this loop examines surrounding squares to see if there is any direction in which *Drawing* may continue. If no such continuation is found then to E$ is added the direction and length of the line which has been traced in the design.

3190-3200 If it is possible to draw from the current square, the direction is checked to see if it is the direction of a line currently being drawn; if so the variable NN is incremented. If it is a new direction, the direction and length of the previously traced line are added to E$. The value attached to any particular direction is calculated by the formula at line 3190 and this value corresponds to the position of the relevant letter in DI$ (defined at line 3040). It may be worth noting in passing that this formula can come in useful in a variety of circumstances where a direction on a rectangular grid requires to be recorded. The values which the line will produce for the eight possible directions are as follows:

```
1 2 3
4 * 5
6 7 8
```

Compare this with the letters specified in DI$ and you will see why they are arranged as they are. The variables D1 and D2 are vertical and horizontal elements of the direction and range between −1 and +1.

3260 This line simply ensures that any *Drawing* left unfinished at the end of the loop is completed.

***The Working Dragon 32**, by David Lawrence costs £5.95 and is available from **Sunshine Books Ltd**, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF*

Module 6

```
3000 REM**************************
3010 REM EXTRACT STRING
3020 REM**************************
3030 FOR I=0 TO 31 FOR J=0 TO 31 LET B(I,J)=A(I,J) NEXT J,I
3040 LET DI$="HUELRGDF" LET E$=""
3050 LET X=0 LET Y=0 LET D1=0 LET D2=0 LET DIR=0
3060 FOR I=0 TO 31 FOR J=0 TO 31 IF B(I,J)=0 THEN GOTO 3250
3070 LET E$=E$+"BM" IF J-X>0 THEN LET E$=E$+"+" ELSE LET
E$=E$+"-"
3080 LET E$=E$+MID$(STR$(ABS(J-X)),2)+","
3090 IF I-Y>0 THEN LET E$=E$+"+" ELSE LET E$=E$+"-"
3100 LET E$=E$+MID$(STR$(ABS(I-Y)),2)+";"
3110 LET X=J LET Y=I
3120 LET B(Y,X)=0
3130 IF Y+D1>=0 AND Y+D1<=31 AND X+D2>=0 AND X+D2<=31 THEN
IF B(Y+D1,X+D2)<>0 THEN GOTO 3190
3140 FOR K=-1 TO 1 FOR L=-1 TO 1
3150 IF X+L>31 OR X+L<0 OR Y+K>31 OR Y+K<0 THEN GOTO 3170
3160 IF B(Y+K,X+L)<>0 THEN LET D1=K LET D2=L GOTO 3190
3170 NEXT L,K IF DIR<>0 THEN LET E$=E$+MID$(DI$,DIR,1)+MID$
(STR$(NN+1),2)+";"
3180 LET DIR=0 LET D1=0 LET D2=0 LET NN=0 GOTO 3250
3190 LET T1=3*(D1+1)+D2+2 IF T1>4 THEN LET T1=T1-1
3200 IF T1=DIR THEN LET NN=NN+1
3210 IF T1<>DIR AND DIR<>0 THEN LET E$=E$+MID$(DI$,DIR,1)+
MID$(STR$(NN+1),2)+";" LET NN=0
3220 LET DIR=T1
3230 LET X=X+D2 LET Y=Y+D1
3240 GOTO 3120
3250 NEXT J,I
3260 IF NN<>0 AND DIR<>0 THEN LET E$=E$+MID$(DI$,DIR,1)+MID
$(STR$(NN+1),2)
3270 DRAW "S8;C3;BM130,50"+E$
3280 IF INKEY$="" THEN GOTO 3280
3290 FOR I=0 TO 63 DRAW "C2;BM130,"+STR$(60+I)+";R64" NEXT I
3300 LET X=0 LET Y=0 DRAW "S4" RETURN
```



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IT STORES EVENT PIXEL

Mr J Martin of Clarence Road, Walthamstow, London E17 writes

Q **I have a Spectrum and have used the command SCREEN$ to save a picture, and LOAD it back, but I cannot find any way of using it. As soon as I press ENTER it disappears and I cannot find anyway of retrieving it.**

A *Screen$* is a command that stores every pixel on the screen When you enter a command such as *Enter* then you are asking the computer to print on the screen a listing of the program This it does and, of course, it overprints the current screen display in the process

The way round this is to auto run the program which will return the control to you If you use a *Print At* statement at 21, @ the print position will be on the bottom line which will give you some work space You would lose whatever was displayed on this line

COMING IN THE MONTHS AHEAD

Andrew Jones of Old Road East Gravesend Kent, writes

Q **I am thinking of buying a Jupiter Ace microcomputer. Do you know if there is much software available for the unexpanded version? I would also like to know the difference between Basic and Microsoft Basic**

A The Jupiter Ace is based around Forth 79, though there are some differences Programs in this should generally work without major changes though some words in the Ace s dictionary are not to be found in Forth 79 and vice versa

Remsoft (18 George Street, Brighton, Sussex) has produced two cassettes for the Ace — *Peeker*, which costs £3 50 and enables you to unravel both Rom and Ram, and *Tape 2*, which costs £4 50 and includes *Night Rider*, *Sketch* and *Editor* More software should become available in the coming monthe

Basic has several dialects Microsoft Basic is probably the most common form Like most Basics found on home computers Microsoft differs from its fellows in relatively minor ways

The form of Basic used on the Sinclair computers is probably the most common after the Microsoft version by virtue of the large number of Sinclair computers in circulation It is interesting to note that the Sinclair Basic is very similar to the new Ansi standard for Basic Perhaps this form will gain more ground

COMMAND WAS CONNECT

Paul Gurney of Hereford Road Hereford writes

Q **I have a 16K Spectrum. On page 169 of the manual it says that if you enter *Clear* 23800 as a direct command, it will give you an idea of what happens when the memory becomes full All I get when I do this is *M-Ramtop* no good This even happens when I try it as soon as I switch on. I do not really understand what is wrong. Is there anything wrong with my Spectrum?**

A There is nothing wrong with your Spectrum This is the result that you were meant to obtain *Clear* and *Clear n* are commands that in effect *New* certain of the routines in the computer

One of the effects of *Clear* 23800 is to lower Ramtop to that address *Clear n* will always lower Ramtop to the specified address, but in this case you have lowered it so much that there is no room for the Basic program or instructions

If you look at page 165 of your manual there is a memory map Look at how much has to be fitted in between 23734 and Ramtop This command gives you just 66 bytes (23800 — 23734) for this entire area No wonder there is no room, and an error code comes up If you look at *Clear* and *Clear n* in the appendix, you will see just what sort of effect they will have on a program

THE MANUAL IS COMING SOON

Gary Foreman of Hazelton Road, Colchester, Essex, writes

Q **Now that the Commodore 64 is here, and I have access to one, I would like to know if the memory map locations are listed anywhere. There is nothing about them in the manual. This would enable me to start writing some machine code programs, and make use of the User Defined Graphics. Also is there any news of a Commodore 64 Programmers Reference Guide, similar to that for the Vic-20?**

A These two questions have effectively the same answer Although I have not seen it, I gather that the 64 Programmers Manual will have a much more complete breakdown of the 64's memory addressing It is due for release soon, though at the time of writing I do not know how much it will cost I presume it will be available from all the usual Commodore dealers

NO NEED TO GO BACK TO BASIC

P A Roberts of St Johns Avenue, Pearl Street, Carlinghow, Batley West, writes

Q **I have recently been writing an assembler program for my BBC model B micro, and I would like to know whether it is possible to access VDU 19 from within the assembler (ie without having to revert to Basic)**

The User Guide does not seem to give many clues to a solution to the problem, but since almost all the other Basic commands have a simple machine-code equivalent for the assembler programmer I'm sure there must be a machine code form of VDU 19.

If this is so can other functions such as *Mode* and *GCOL* be accessed in a similar way?

A The equivalent of VDU in assembler is

```
LDA #n
NEWLINE
JSR & FFEE
```

where n is the number you want to use, in your case nineteen You can repeat this as you need There is a full table of VDU codes in the manual

MODEL B IS A BETTER CHOICE

D Nugent of Parkway, Coxheath Kent, writes

Q **I am considering buying a BBC computer, but I am unsure of a few points which I hope you would clear up for me. Would the model A have the same graphics capabilities as the B if the A was upgraded to 23K Also would the programs for the model B *Load* and can in the same way on a 32K model A? Finally what other differences are there between the model A and the model B?**

A As far as graphics and programs go then a 32K model A will be able to run model B programs The essential difference lies in the additional facilities that the model B has for peripherals The model B has both parallel and serial printer interfaces, and the 'Tube , which allows you to add a second processor to your model B The second processor does not have to be the same as the on board 6509. At the moment, Acorn is developing a Z80A microprocessor that will be compatible via the tube This will also make CP/M possible If you are looking for a computer that can become the centre of an extended system, then the model B will be a much better choice

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Ziggurat



Simulating reality

A computer simulation is a copy in numerical form of some abstraction from reality

Take population growth as Malthus noted if there are no checks then the growth of population is exponential in form This can be copied if we abstract from reality by forgetting births and deaths and only concentrating on the increase in size at a constant rate

If R is the rate and P is the original population size (already set) we can compute the size of successive years populations by one line

```
FOR I = 1 TO 20 P = P * R PRINT I P NEXT I
```

The same line can be split into four separate lines for machines such as the ZX81 If you try different values for R, you will be able to see how quickly such a population would grow — if nothing else happened

A different approach to simulating (sometimes called modelling) population growth is used by the program normally called *Life* Many versions have been written but the basic program is listed in *Basic Computer Games* by David Ahl (1978) based on an idea by Martin Gardner in *Scientific American* of October 1970

The original version of *Life* used a number of counters — itself a simulation — which were added to or subtracted from according to three rules Any counter with two or three neighbours survives every counter with four or more neighbours is removed (or dies) and every empty cell with *exactly* three counters adjoining has a counter placed upon it (is born) From different starting configurations of counters different sets will have different life histories some populations even die out

The *Life* program is a helpful reminder that, just because something has always happened before nothing has to happen in the future

Consider the growth in the number of computers Over the last three years they have grown at a rate of about say 48 percent (the figure is a guess) so that in 20 years the number of computers will be about 2 000 times the number at the beginning of the three years If 1 percent of the population had a computer at the start of the three years that means in 17 years there will be 20 computers per head Not likely

Of course things might be different If the total population is T (say 100 units) and the number of people with a computer is P, then the number of people who might buy a computer is $T - P$ The likelihood of a computer being purchased depends upon how many are without computers (ie $T - P$)

Suppose therefore that the number of new purchasers depends on the present number of owners and non-owners and some constant. So if I is the number of new purchasers $I = K * P * (T - P)$ Assuming we have values for K T, and an initial value for P we can program

```
1000 FOR J = 1 TO 20 I = K * P * (T - P)
1010 PRINT J I + P (I + P)/P P = P + I NEXT J
```

which will list the time period new population and the ratio between the new population and the previous population of computers (Note how the purchasers have become a *population* of computers?)

If you set $K = 0\,005$ $P = 1$ and $T = 100$ then the growth rate (the final column) starts at 1 495 then 1 493 then 1.488 and after six years it is still 1 475 By year 10 the population is 30 463 Even by year 20 the population is only 98 407 not 2000

Really this new model is too simple — but it is better than the first attempt What we really want is an even better one

Boris Allan

Puzzle

Cubed beginning

Puzzle No 41

The number 153 has the following unusual property If each of the digits is cubed and these cubes are added together we arrive back at the original numbers

$$1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153$$

Can you find any other numbers with this property?

Solution to Puzzle No 36

Starting with zero and one each term in the Fibonacci series is formed by adding together the preceding two terms eg

0 1 1 2 3 5 8 13 21 34 55

The following program generates the first 20 terms of the Fibonacci series, and displays the result of dividing each term by the preceding one The value so obtained converges on the golden number

```
10 LET X = 0
20 LET Y = 1
30 FOR N = 1 TO 19
40 PRINT X, X/Y
50 LET X = X + Y
60 PRINT Y Y/X
70 LET Y = X + Y
80 NEXT N
```

The value of the golden number is 0 61803398 ... Stability in the 8th decimal place is shown by the convergence of the 9th decimal place

Winner of Puzzle No 36

The winner is D Pain Yew Tree Lane, Rotherfield East Sussex who receives £10

Top 10

Atari

1(2)	Astro Chase	(First Star Software)‡
2(7)	Preppie	(Adventure International)
3(1)	Air Strike	(English Software)
4( )	Galaxian	(Atari)
5( )	Canyon Climber	(Data Soft)
6(4)	Shamus	(Synapse)
7(–)	Pac-Man	(Atari)
8(5)	Jumbo Jet Pilot	(Thorn EMI)
9(–)	Hellcat Ace	(Microprose)§
10(3)	The Scott Adams Adventures	(Adventure International)†

Cartridge †24K cassette ‡32K cassette §48K disc

(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Spectrum

1(1)	The Hobbit	(Melbourne House)
2(2)	Penetrator	(Melbourne House)
3(–)	3D Tunnel	(New Generation)
4(–)	Arcadia	(Imagine)
5(–)	Flight Simulation	(Psion)
6(–)	Spectrum Chess	(Artic)
7(7)	Spectral Invaders	(Bug-Byte)
8(8)	Hungry Horace	(Psion)
9(6)	Escape	(New Generation)
10(4)	Orbiter	(Silversoft)

*Requires 48K

(Figures compiled by Buffer Micro Shop London 01 769 2887)

ZX81

1(2)	Frogger	(DJL Software)
2(3)	3D Defender	(JK Greye)
3(3)	Gauntlet	(Colourmatic)
4(4)	Flight Simulation	(Psion)
5(6)	Gulp II	(Campbell Systems)
6(1)	Black Crystal	(Carnell Software)
7(–)	Sea War	(Panda)
8(–)	Adventure 1	(Abersoft)
9(–)	Mazogs	(Bug-Byte)
10( )	ZXAS	(Bug-Byte)

All 16K.

(Figures compiled by Buffer Micro Shop London 01 769 2887)

Vic20

1(3)	Grid Runner	(Llamasoft)
2(–)	Abductor	(Llamasoft)
3(9)	Sea	(Commodore)
4(2)	Jellymonsters	(Commodore)
5(–)	Gorf	(Commodore)*
6(4)	Andes Attack	(Llamasoft)†
7(1)	Traxx	(Llamasoft)†
8(5)	Hopper	(Rabbit)
9(3)	Myriad	(Rabbit)
10( )	Shark Attack	(Rabbit)

Cartridge †Requires 8K or 16K

(Figures compiled by the Vic Centre London 01 992 9904)

Books

1( )	Creative Graphics on the BBC Microcomputer, *Cownie*	(Acornsoft)
2(2)	Assembly Language Programming for the BBC Micro, *Birnbaum*	(Macmillan)
3(5)	Discover Forth, *Hogan*	(Osborne)
4(6)	Programming the 6502, *Zaks*	(Sybex)
5(3)	Z80 Assembly Language Programming, *Leventhal*	(Osborne)
6(–)	Over the Spectrum, various authors	(Melbourne House)
7(7)	Basic Programming for the BBC Micro, *Cryer*	(Prentice Hall)
8(–)	Graphs and Charts on the BBC Microcomputer, *Harding*	(Acornsoft)
9(8)	Spectrum Book of Games, *James et al.*	(Granada)
10(–)	Illustrating Basic, *Alcock*	(Cambridge CUP)

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